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ILLUSTRATIONS
OF THE
INFLUENCE OF THE MIND UPON THE BODY
IN HEALTH AND DISEASE.

"There is not a natural action in the Body, whether involuntary or voluntary, that may not be influenced by the peculiar state of the mind at the time."—JOHN HUNTER.

"Some are molested by Phantasie; so some, again, by Fancy alone and a good conceit, are as easily recovered. . . . All the world knows there is no vertue in charms, &c., but a strong conceit and opinion alone, as Pomponatius holds, *which forceth a motion of the humours, spirits, and blood, which takes away the cause of the malady from the parts affected*, The like we may say of the magical effects, superstitious cures, and such as are done by mountebanks and wizards. As by wicked incredulity many men are hurt (so saith Wierus), *we find, in our experience, by the same means, many are relieved*. . . .

"Imagination is the *medium deferens* of Passions, by whose means they work and produce many times prodigious effects; and as the Phantasie is more or less intended or remitted, and their humours disposed, so do perturbations move more or less, and make deeper impression."—*Anatomy of Melancholy*. BURTON, 1651.

ILLUSTRATIONS
OF THE INFLUENCE OF
THE MIND UPON THE BODY
IN HEALTH AND DISEASE,

DESIGNED
TO ELUCIDATE THE ACTION OF
THE IMAGINATION.

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BY
DANIEL HACK TUKE, M.D., F.R.C.P., LL.D.,

LATE PRESIDENT OF THE MEDICO-PSYCHOLOGICAL ASSOCIATION;
JOINT AUTHOR OF THE "MANUAL OF PSYCHOLOGICAL MEDICINE;" AND CO-EDITOR OF
THE "JOURNAL OF MENTAL SCIENCE."

SECOND AMERICAN FROM THE SECOND ENGLISH EDITION.



PHILADELPHIA:
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1884.

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1884

TO
SIR JAMES PAGET, BART., F.R.S., D.C.L. OXON.,
SERJEANT SURGEON-EXTRAORDINARY TO THE QUEEN,
LATE LECTURER ON GENERAL ANATOMY AND PHYSIOLOGY
AT
ST. BARTHOLOMEW'S HOSPITAL
AND
WARDEN OF THE COLLEGE,
IN GRATEFUL ACKNOWLEDGMENT OF THE INFLUENCE
OF
HIS HIGH MORAL AND INTELLECTUAL QUALITIES,

This Work

IS INSCRIBED
BY
AN OLD PUPIL.

PREFACE TO THE SECOND EDITION.

SINCE the former edition of this work there has been a remarkable increase in the amount of intelligent interest felt in the more subtle relations existing between Mind and Body, and, happily, physicians of acknowledged position have devoted their attention to the study of psychical phenomena too often neglected even by those whose special province it is to determine their nature, and to enlighten the public mind as to what is real on the one hand, and what is either fancy or fraud on the other.

The author feels that he cannot too strongly emphasize the position taken by him in this work, namely, that he only aspires to lay down and illustrate certain psycho-physical principles which appear clearly recognizable in the light of modern physiology. It is maintained that the area of these principles ought to be traversed, and their application carried out to their furthest possible limits before we go in quest of others. At the same time, nothing can be more beside the intention of the writer than to deny that wider laws or a larger circle of phenomena than he has hitherto grasped may exist, and may still be discovered. Dogmatic incredulity may betoken ignorance, not knowledge, as in the case of a countryman I once saw at the British Museum, who, when shown a huge meteoric stone and told it had fallen on the earth from the sky, said he would never believe *that*. In a similar spirit, and from a like cause, we too may "give way to peremptory fits of asseveration," against which Lord Bacon warns us, who cautions us also "not to usurp a kind of dictatorship in science." There is such a thing as a scientific snob. He it is who is quite certain that he has fathomed the depth the great ocean of knowledge, and that he can gauge the spheres the measure which he carries in his own pocket.

It consists, however, with the modest sense of limited knowledge, which men of science ought to possess, to subject all asserted and apparent facts, when they are at variance with ordinary experience, to the most rigorous tests, and when demonstrated, to endeavor to show that they form no real exception to hitherto ascertained laws, although they may transcend them.

It remains only to express the great obligation under which I lie to Mr. Victor Horsley, F.R.C.S., of London, for having not only revised the proof-sheets in their passage through the press, but for having rendered efficient help in various ways, including the preparation of the Diagrams which have been added to this edition, and which will, I hope, render clearer the description given of the action of Mind upon Body in health and disease.

LYNDON LODGE, HANWELL, W.

October 2, 1888.

PREFACE TO THE FIRST EDITION.

IN November, 1869, I met with the following in a newspaper under the heading of "Curative Effects of a Railway Collision:"

"Allow me to confirm all that your two correspondents have related with respect to the alarming collision on the 17th instant, on the Midland line.

"Nothing needs to be added either to their descriptions of the circumstance or to their just condemnation of the reckless negligence which brought us so near to death; but the shock produced so curious an effect on myself—an effect, perhaps, unparalleled in the history of railway accidents—that you will, perhaps, excuse my troubling you with the details.

"At my hotel in Manchester on Tuesday night, I was seized with all the symptoms of a violent attack of rheumatic fever; in fact, my condition so alarmed me, and my dread of a sojourn in a Manchester hotel bed for two or three months was so great, that I resolved to make a bold *sortie*, and, well wrapped up, start for London by the 3.30 P.M. Midland fast train from the London Road terminus. From the time of leaving that station to the time of the collision, my heart was going at express speed; my weak body was in a profuse perspiration; flashes of pain announced that the muscular fibres were under the tyrannical control of rheumatism, and I was almost beside myself with toothache. Crash! smash! bump! and bang! and from side to side of the carriage I went like a billiard ball under a hard cushion hit. The compartment was soon seen to be sprinkled with the blood of a hapless victim whose face had come into crushing contact with it."

The rest of this part of the paper was unfortunately wanting, but I learnt from other sources that, as the heading intimated, the patient was cured of his rheumatism. The remarks which this circumstance elicited

from the press (general and medical) led me to think that the whole subject of the influence of the Mind upon the Body, deserves more serious and systematic consideration than it has received. In forwarding, soon after, to the *Journal of Mental Science*,¹ a paper bearing the title of the present work, I observed: "It is now some time since I endeavored to formularize the generally admitted facts of physiology and psychology so far as they bear on this question, and to collect from the sources at my command all authenticated facts illustrative of this influence. Dissatisfied with my work I laid my cases aside. Judging, however, from the remarks made, that imperfect as these cases are they may be of some service, I conclude to forward them to the *Journal of the Association*."

The objects of the following pages may be thus stated :

1. To collect together in one volume authentic Illustrations of the influence of the Mind upon the Body, scattered through various Medical and other works, however familiar to many these cases may be, supplemented by those falling within my own knowledge.

2. To give these cases fresh interest and value by arranging them on a definite physiological basis.

3. To show the power and extent of this influence not only in health in causing Disorders of Sensation, Motion, and the Organic Functions, but also its importance as a *practical* remedy in disease.

4. To ascertain as far as possible the channels through, and the mode by, which this influence is exerted.

5. To elucidate by this inquiry, the nature and action of what is usually understood as the Imagination.

"Quicquid agunt homines, votum, timor, ira, voluptas,
Gaudia, discursus, nostri est farrago libelli."

There are two classes of readers to whom I wish more especially to address myself. The medical reader, who I hope may be induced to

¹ About 190 pages have appeared in that Journal. The chapters already published have been much extended, and Part IV., treating of the Influence of the Mind upon Disease, is, in common with several chapters, entirely new.

employ Psycho-therapeutics in a more methodical way than heretofore, and thus copy Nature in those interesting instances, occasionally occurring, of sudden recovery from the spontaneous action of some powerful moral cause, by employing the same force designedly, instead of leaving it to mere chance. The force is there, acting irregularly and capriciously. The question is whether it cannot be applied and guided with skill and wisdom by the physician. Again and again we exclaim, when some new nostrum, powerless in itself, effects a cure, "It's only the Imagination!" We attribute to this remarkable mental influence a power which ordinary medicines have failed to exert, and yet are content, with a shrug of the shoulders, to dismiss the circumstance from our minds without further thought. I want medical men who are in active practice to utilize this force, to yoke it to the car of the son of Apollo, and rescuing it from the eccentric orbits of quackery, force it to tread, with measured step, the orderly paths of legitimate medicine. "Remember," said Dr. Rush, in addressing medical students, "how many of our most useful remedies have been discovered by quacks. Do not be afraid, therefore, of conversing with them, and profiting by their ignorance and temerity. Medicine has its Pharisees as well as religion; but the spirit of this sect is as unfriendly to the advancement of Medicine as it is to Christian charity."¹

The other class comprises those non-medical readers who may happen to peruse this work; and these, the author hopes, may be disposed to regard in a different light from what they may heretofore have done, the success of some of the fashionable modes of treatment current at the present day. Some of those, also, who are interested in the manifestations of Modern Spiritualism, may find it worth their while to acquaint themselves fully, *in the first instance*, with those phenomena which may certainly be explained by a reference to the principles laid down in these pages. From this point of view this book may, perhaps, be regarded as

¹ He thus continues, after reminding his class that improvement in Medicine is not to be derived only from colleges and universities, "In the pursuit of medical knowledge, let me advise you to converse with nurses and old women. They will often suggest facts in the history and cure of diseases which have escaped the most sagacious observers of nature." He adds that by so doing "you may discover *laws of the animal economy which have no place in our systems of nosology or in our theories of physics.*"

somewhat of an introduction to the study of the alleged facts, which now attract so much attention, for whatever may be the explanation ultimately arrived at in regard to them, it is equally essential to ascertain what is the range of the phenomena which can be fairly explained by well-recognized psycho-physical principles.

Cerebral Physiology and Mental Philosophy have been referred to as far as is essential to elucidate, by the application of admitted principles, the cases which are recorded in this work. The collection of so many striking illustrations of the profound influence of the Mind upon the Body would alone serve to convince the reader of the absurdity of dismissing such cases with the flippant remark just referred to, as if the Imagination could solve a great many difficult and inconvenient problems, but could never be employed for any useful practical purpose. But however valuable a simple collection of cases may be, and certainly "Truth can never be confirmed enough," the author thought its value would be greatly enhanced by arranging them in accordance with the generally received psychological and physiological principles.

If the labor and thought required to prepare a reliable collection of psycho-physical phenomena, such as the present work contains, be any measure of its utility to the reader in quest of facts of this nature, I venture to hope that such an inquirer will not be unthankful for the assistance now rendered him; and to those who are familiar—possibly *ad nauseam*—with many of the cases which are given, I am inclined to think, judging from my own experience, that they will find it convenient to have in one volume, for ready reference, a number of cases not readily found in the journals and many publications of an ephemeral character. My aim, therefore, has mainly been to ascertain and apply the already known. As Browning says—

"To shoot a beam into the dark assists;
To make that beam do fuller service, spread,
And utilize such bounty to the height,
That assists also, and that work is mine;

holding, as I do, with Lord Bacon, that "Every man is a debtor to his profession, and ought of duty to endeavor to be a help thereunto."

August, 1872.

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EXPLANATION OF DIAGRAM I.

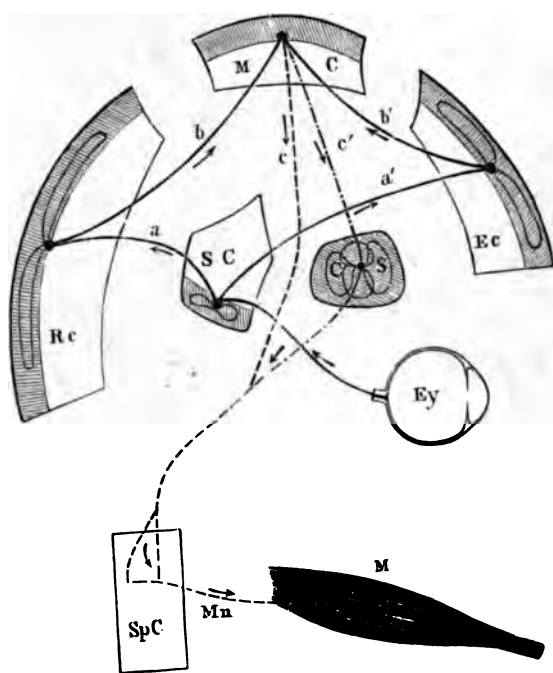
To illustrate the paths along which nerve impulses causing the Emotional Phenomena of (1) Blushing, (2) Dilatation of the Pupil, (3) Quickening or Slowing (to Stopping) of the Heart's beat, and (4) Sensation at the pit of the Stomach (Epigastrium), when an individual's attention is visually attracted by an exciting cause.

- C = Surface of brain (cortex).
- ON = Optic nerve.
- P = Pupil (seen in profile).
- Cb = Small brain or cerebellum.
- B = Medulla oblongata.
- Sc = Spinal cord.
- Sy = Sympathetic nerve
- F = Facial Nerve.
- 8n = Eighth cervical spinal nerve.
- CP = Cardiac plexus of nerves.
- R = Recurrent laryngeal nerve.
- V = Vagus nerve.
- G = Gullet.
- W = Windpipe.
- L = Larynx (vocal apparatus).
- S = Stomach.
- H = Heart.
- CA = Carotid artery.
- FA = Facial artery.

With the aid of the diagram it is easy to understand how the stimulation of the optic nerve (ON) will cause active disturbance of the corpuscles forming the cortex of the brain, first, probably in the postero-lateral area (the sensory perceptive centre for vision); and, secondly, the anterior and posterior regions. From each of these positions the nerve vibrations, having aroused intelligent reasoning and strong emotion, will stream down to the medulla oblongata (between Cb and B) where the centres of so-called organic life are all grouped together. These paths are represented yellow. Here the emotional impulses will, under certain circumstances of love, shame, etc., pass along (F) the facial nerve, and thus cause movements of the facial muscles, and so produce facial expression, and also will pass by the same means to the local vaso-motor apparatus, and cause dilatation of the small arterioles, etc., producing the phenomenon of blushing. In addition the emotional impulse will pass down the spinal cord (Sc) and out along the eighth spinal nerve (8n), then running up the sympathetic nerve (Sy) will reach the pupil (P) and actively dilate it. All these channels are colored red. Under other circumstances, such as fear,

rage, etc., the emotional impulse will pass at once from (B) into the sympathetic (Sy), and then to the facial bloodvessels (Fa), causing these to contract strongly, and also along the facial nerve (F), making the muscles act spasmodically, thus producing pallor and the expression of terror. Interference with the regular beating of the heart is brought about by the nerve force passing down either the vagus nerve (V) with the effect of slowing the heart or actually stopping it, or else along the spinal cord and out along the spinal nerves to the sympathetic and so to the cardiac plexus, these impulses quickening the heart's rate. But, in addition, the voice is materially altered, and this is produced by the emotional impulse travelling down the vagus nerve (V), then up along a branch of the same (R) to the voice apparatus or larynx, and by causing irregular or excessive contraction of the muscles therein produce abnormal tones. Lastly, the sensation at the pit of the stomach may be entirely subjective and produced in the bulbar centres (B) at least without actual disturbance of the vagus nerve endings, or it may be that the emotional nerve force travels down to the stomach (S) along the distribution of the nerve (V), and is again reflected thence to the cortex of the brain.





EXPLANATION OF DIAGRAM II.

MC = Motor portion of cortex of brain.
Ec = Emotional portion of do.
Re = Rationalizing do.
SC = Sensory perceptive centre in cortex.
CS = Corpus striatum.
Ey = The eye.
SpC = Spinal cord.
Mn = Muscle nerve.
M = Muscle.

- a a'** Are afferent paths from the sensory perceptive centre to the emotional and reason centres.
- b b'** From these portions of the cortex fibres b b' lead to the cortical motor centres.
- c c'** Are efferent paths either passing straight down through the direct pyramidal tracts through the spinal cord, or, and perhaps in addition, round by the corpus striatum.

ILLUSTRATIONS OF THE INFLUENCE OF THE MIND UPON THE BODY.

INTRODUCTORY.

THE Mind acts upon the Body through its threefold states of—

- I. INTELLECT.
- II. EMOTION.
- III. VOLITION.

The terms chosen for the title of this work accord with popular usage, and are probably less likely to mislead than any others which might be used. It is more than probable that no amount of scientific knowledge will ever displace the time-honored phrases of "Mind" and "Body."

Psychologically, we intend to indicate by the title we have adopted, the design of illustrating by a considerable collection of striking Cases the often admitted, but too frequently forgotten, and still more frequently neglected, truth, that the state of the Mind, comprising therein Intellect, Emotion, and Volition, exerts an enormous influence, for good or evil, upon the body with which it is associated—including in this term all Sensations, Movements, and the Organic Functions. It must be clearly understood that under "Mind" we do not, and that under "Body" we do, include the special senses. Sensation (special and general) is treated of, as being influenced by intellectual, emotional, and volitional states.

Physiologically considered, the Illustrations range over the effects produced by the action of the nerve corpuscles of the encephalic centres concerned in intellectual, emotional, and volitional states of mind upon the sensory and motor ganglia, the centre of the sympathetic, and through the outgoing nerves upon

the whole body. Whether pure Emotion is a function of the hemispheres, and if not, to which of the lower ganglia it should be consigned, are questions upon which differences of opinion still exist, and will claim some attention in a future section. Be this as it may, however, the cerebral hemispheres act upon the ganglia below them, so far as the Intellect and Will are concerned; and, further, whatever cerebral physiology may teach as to minute points, the Cases brought together in this volume will none the less illustrate the truth, and the importance of the truth, that the Mind or brain influences—excites, perverts, or depresses—the sensory, motor, vaso-motor, and trophic nerves, and through them causes changes in Sensation, Muscular Contraction, Nutrition, and Secretion.

The bearing of the doctrines of the reflex or automatic action of the brain, and of the influence transmitted through vaso-motor nerves, will be considered as we proceed. Their importance must be evident to all who have studied the action of Mind upon Body.

PART I.

THE INTELLECT.

CHAPTER I.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

Section I.—Retrospective Sketch.

Unzer and **John Hunter** were among the first clearly to perceive and express the mental or psycho-physical law which lies at the foundation of the principal phenomena properly comprised under the influence of the Intellect or Thought upon the body, including sensation as well as motion, especially in regard to the effects of Expectation, and what is ordinarily understood as the Imagination. Thus **Unzer** in his great work, published in the year 1771, writes: "Expectation of the action of a remedy often causes us to experience its operation beforehand" (i. p. 113).

There is another striking observation made by this physiologist, bearing upon the influence of intellectual states upon the body. He supposes the case of a person who sees a visionary figure resembling an individual who caused him bitter vexation long before. He becomes pale with fear. This occurs, **Unzer** points out, before he remembers whom the figure resembles. There is no action of the Will, and no consciousness in the sense of recognition. "How often in such cases," he remarks, "we hear persons say, 'This appearance terrifies, affects, or calms me, without my knowing why; some subordinate ideas, which I cannot remember, must be the cause.' When the person whose figure we have seen, actually appears also, no other action results than as stated above; we become pale as before, but now we know why" (p. 120).

Hunter had his attention drawn to the phenomenon of Animal Magnetism, and in his lectures on Surgery (1786-7), delivered a

few years later than the appearance of Unzer's work in Germany, explained those which he witnessed on the principle of Attention and Expectation. There is no reason to suppose he was acquainted with Unzer's writings. He says: "I was asked to go to be magnetized, but at first refused, because the spasm on my vital parts was very likely to be brought on by a state of mind anxious about any event, . . . and I feared lest it should be imputed to animal magnetism. But considering that, if any person was affected by it, *it must be by the Imagination being worked up by the attention to the part expected to be affected*, and thinking I could counteract this, I went; and accordingly when I went I was convinced by the apparatus that everything was calculated to affect the Imagination. When the magnetizer began his operations, and informed me that I should feel it first at the roots of my nails of that hand nearest the apparatus, *I fixed my attention on my great toe*, where I was wishing to have a fit of the gout; *and I am confident that I can fix my attention to any part until I have a sensation in that part*. Whenever I found myself attending to his tricks, I fell to work with my great toe, working it about, etc., by which means I prevented it having any effect upon me" (ii., vol. i. p. 337). It is nearly a century ago since these sentences were written, and those which we have italicized show that the fundamental principle, to which we shall have so frequently to refer in this work, was most clearly comprehended by this remarkable man, who might have been as great a metaphysician as he was a physiologist. It really contains the gist of all that has been written since on the influence of Expectant Attention and the Imagination.¹

Johannes Müller (1838) gave a luminous exposition of the influence of mental states, especially ideas, upon the bodily movements. "The idea of a particular motion," he says, "determines a current of nervous action towards the necessary muscles, and gives rise to the motion independently of the will. Again, "any sudden change in the ideas, though without emotion, and having

¹ It does not follow from this explanation that Imagination, Expectation, and kindred states of mind, explain *all* the phenomena produced by mesmerists, nor indeed does it *necessarily* follow that the same phenomena are always due to the same cause. For our present purpose, however, we are justified in saying that certain purely psychical agencies produce certain physical results. With the alleged magnetism of A by B, we are not now concerned, most important and interesting as this would be, if proved.

reference to mere external objects, may excite involuntary movements—as laughter” (iii. pp. 944, 1396). Under the heading “movements excited by ideas,” he observes that certain groups of muscles are constantly prone to involuntary motion, owing to the excitability of the parts of the brain from which the nerves arise. “The Sensorium acts here in the same way as an individual nerve in which any sudden change of condition, of whatever kind, sets the nerve force in action.” He points out that, in yawning, the *disposition* to the movements of the muscles exists previously, and this “becomes manifested *when the idea gives to the nervous force the determinate direction.*”

Müller expresses himself as decidedly as John Hunter in regard to the influence of Expectation. “It may be stated, as a general fact, that any state of the body, which is conceived to be approaching, and which is expected with certain confidence and certainty of its occurrence, will be very prone to ensue, as the mere result of that idea” (iii. p. 1390). He only makes one condition, “if it do not lie beyond the bounds of possibility.”

In connection with ideas, whether present to the consciousness or not, the action of the encephalic centres, apart from the Will, and the influence of this action upon sensation and the movements of the body, are of the first importance. The automatic or reflex action of the brain, which has attracted so much notice of late, cannot be disregarded in the consideration of the operation of the mental faculties upon the system.

Unzer, who, to a considerable extent, anticipated the observations of Marshall Hall in regard to the reflex action of the spinal cord, applied the same principle to explain many psycho-physical phenomena. In the following remarkable passages he enunciates the doctrine of the reflex action of the brain in regard to instinctive acts: “Any painful external sensation immediately excites the war-instinct, and the movements proper to the instinct as instantaneously follow, even in man himself, and before the cause of the sensation is known. Between the external sensation exciting the instinct and its sentient actions, no traces of conceptions can be discovered, consequently there are no material ideas of imaginations, foreseeings, etc., produced by the external sensations; so that there appears to be a direct transition [Uebergang] of the latter into the instinct itself, and the material ideas proper to it to take effect in the sentient actions of the other. *So that it*

may, in some degree, be asserted that in the instincts, the brain turns back [umwendete] the felt impression, and reflects it on the nerves appropriate to the sentient actions of the instinct, just as an unfelt external impression is reflected in the ganglia, and this without the material ideas of the conceptions necessary to the instinct becoming an object of special thought, they being too little developed; and without its sentient actions being obviously excited and connected with each other, according to psychological laws" (i. p. 279).

Gall is shown by Professor Laycock (iv. p. 106) to have held the same opinion. He "fell into the views of Unzer and Prochaska. He applied them to the passions, and maintained that joy, sorrow, fear, etc., are not excited by the Will, but felt before the individual has so much as dreamed of them. All that passes is an arrangement produced by nature, intended for the external world, to secure 'la conservation de l'animal et de l'homme, sans qu'il y ait conscience, reflexion, ni participation active de l'individu.' Gall also asserted that *these passions, when of a certain intensity, are accompanied by actions which are independent of the Will and consciousness, but which all tend towards the end proposed by nature, namely, the conservation and ease of the individual; thus, in fact, classing the phenomena of the passions with the instinctive movements, and those excited by external stimuli, independently of consciousness and of the brain, and which have been remarked on by Unzer, Haller, Prochaska, Alison, Hall, Müller, and Grainger*" (loc. cit.).

Müller, who was at the time acquainted with Marshall Hall's writings, observes that "reflected motions include all muscular actions which arise from impressions on sensitive nerves exciting motor nerves to action through the intervention of the brain and spinal cord" (iii. p. 927). In this passage, the brain, it will be seen, is included in the range of reflex action.

Elliotson, in 1837, became an enthusiastic believer in animal magnetism, and by his experiments at University Hospital, renewed attention was drawn, in England, to the mesmeric phenomena which attracted Hunter's notice, and which led him to the conclusion that they were due to Imagination, understood in the sense of Expectation; in short, that they could be explained on the principle that a certain state of mind induces certain bodily sensations, without charging "the subject" with imposture.

Laycock was one of those who investigated this subject with care. He observed (v., July, 1839, p. 25) that the mesmeric sub-

jects who two years before had attracted so much attention—the Okeys—were “of the same family as the Pythian priestess, the wizards of Kamschatka, the whirling dervishes of India, the serpent-eaters of Egypt, the second-sight men of the Highlands, the ‘wise men’ and prophets who may still be found in Yorkshire, all knowing how to excite convulsions, or delirium, or spectral illusions and somnambulism, in themselves or their dupes, by mental acts or drugs.” In his *Nervous Diseases of Women* (1840), he observes that the phenomena in these girls “were undoubtedly not feigned,” but that Dr. Elliotson, in endeavoring to ascertain their cause, “appears to have overlooked the influence which the Will can exercise on the brain, when both are habituated to the effort, and the almost incredible acuteness of the senses, and of cunning, developed in hysterical girls. It is quite a mistake to suppose that because a female appears not to *feel*, that she has not an acute sense of *touch*; or because she cannot *see*, that she cannot most acutely *listen*.” “The phenomena of Mesmerism (so called) are all illustrations of the power of the Will over the brain” (iv. pp. 111, 355). He does not exaggerate when in the preface to his work, Laycock observes that “the action of the Will on the sensorial fibres of the brain, the nature and laws of sensation, the extension of the doctrine of the reflex function of the spinal cord to the encephalic ganglia, and all the consequences which necessarily follow, cannot fail, I think, to interest the intelligent professional reader, and afford matter for deep thought.” And in his chapter, “The Instinctive Actions in Relation to Consciousness; the Brain subject to the Laws of Reflex Action,” he quotes the passage of Gall already given, and adds, “the importance of these doctrines is apparent. They corroborate the truth of the proposition already laid down, that the cranial ganglia (the part of the cerebrum which may be considered as the seat of the passions), although the organ of consciousness, are subject to the same laws as those which govern the other ganglia, the diffused nervous system of animals, and the vital mechanism of vegetables.” The reference here, it will be seen, is to the passions and the movements dependent on them (pp. 107, 172). The two points on which Dr. Laycock insisted, were—first, the extension of Bell’s demonstration of the distinction between the motor and sentient nerves, and so “placing the sensorial fibres under the power of

the Will;"¹ and, secondly, the extension of Marshall Hall's doctrine to the brain; so "applying the laws of the excito-motory system to the phenomena, not of the spinal cord only and its prolongation, but to the brain also, and the diffused nervous system" (p. 86). He did not overlook the importance of involuntary Attention (as well as the Will), which he classed "with the conservative acts, or rather with the excito-motor phenomena," and illustrated it by the sensation a nervous female experiences on being pointed at, which "probably depends upon changes in the central terminations of the sensitive nerves, excited by the act of Attention."

Sir H. Holland, it should be observed, in the chapter on the "Effects of Mental Attention on Bodily Organs" in his very suggestive work *Medical Notes and Reflections*, 1839, took essentially the same view, basing his conclusions upon philosophical considerations.

Laycock points out that Dubois in his work on *Hypochondriasis*, published in 1837, applied the same principle to the origin of that disease, and that Bonnet (about 1760) "maintained the views respecting the agency of Attention on the fibres of the brain which I have already advocated." Referring to Mesmerism, he adds that the phenomena will be useful in more than ever directing inquiry "to the action of Will on the sensorial fibres of the brain, and through these on the sensitive nerves," etc. (iv. pp. 112, 113).

Mr. Braid, in the year following the publication of Laycock's book, November, 1841, did, in fact, throw a flood of light on the influence of the Mind upon the Body by the investigations of the above phenomena. His experiments were really a systematic repetition, on an extensive scale, of Hunter's experiment on himself.

He induced many of these mesmeric phenomena by his own method, which, he held, owed its success to "an impression made on the nervous centres by the physical and psychical condition of the patient, irrespective of any agency proceeding from or excited into action by another" (vi., 1843, p. 32).

One sentence in his book contains the pith of the whole subject

¹ Müller held this view also: "There is in the central organs a power of voluntarily directing the mind to all the cerebral and spinal nerves, even to the nerves of common sensation and the nerves of special sense" (iii. p. 937).

as far as relates to the influence of the Imagination or Expectation: "The oftener patients are hypnotized from association of ideas and habit, the more susceptible they become, and in this way they are liable to be affected *entirely through the Imagination*. Thus if they consider or imagine there is something doing, although they do not see it, from which they are to be affected, they *will become affected*; but, on the contrary, the most expert hypnotist in the world may exert all his endeavors in vain, if the party does not expect it, and mentally and bodily comply, and thus yield to it" (op. cit.).

Further, in referring to the Okeys, he says, "I have varied my experiments in every possible form, and clearly proved the power of the Imagination *on those previously impressed*, as the patients have become hypnotized or not by the same appliance, according to the result which they previously expected. This readily accounts for the result of Mr. Wakley's experiments with the Okeys" (p. 61). In subsequent publications Mr. Braid examined and explained the phenomena of "Electro-biology."¹ The importance of Mr. Braid's experiments and conclusions will be frequently referred to in this work.

Returning to Dr. Laycock's important contributions to cerebral physiology in connection with involuntary and unconscious mental manifestations, it should be added, in chronological order, that, in his paper "On the Reflex Functions of the Brain," 1844 (vii., January, 1845), this doctrine was brought forward "in a more physiological form," and in subsequent writings he has followed up the subject with great philosophical acumen. Dr. Carpenter has, also, by his masterly exposition of the rationale of the phenomena of Mesmerism, so far as they are due to the influence of Expectant Attention or dominant ideas, done essential service to this department of Mental Philosophy. Indeed, there

¹ Dr. Grimes, Professor of Medical Jurisprudence in Castleton Medical College, U. S., published a work in 1845 on the subject; Dr. Darling, an American, who excited much interest in it, in Edinburgh, in 1851, says this was long prior to the performance of any experiments of the kind. In 1849 the Rev. J. B. Dods lectured on "Electro-biology" before the Senate of the United States. Le Roy Sutherland, however, states that he was the first to exhibit these experiments at Boston, U. S., in December, 1843. Dr. Collyer puts in a similar claim. In 1845 Dr. Elliotson published some interesting experiments made on a person subjected to mesmeric manipulations, which showed the remarkable effects produced by suggestion in a susceptible state of the brain.

is no standard physiological work which enters so fully into this class of phenomena as the fourth edition of his *Human Physiology*, published in 1852.¹ His full admission of the genuineness of a series of facts suspiciously looked upon by medical men and physiologists, even as late as that year, and the use he made of them as illustrations of important principles in physiology, greatly advanced their recognition. His views and those of Professor Laycock diverge on the doctrine of sensation, and it seems right to state as concisely as possible in what this difference consists, in order that the reader may be in possession of the leading theories on this question. Writing on "Odyle, Mesmerism, and Electrobiology," Dr. Laycock observes that "one great fact proper to all is, that the action of the Will and of Consciousness is suspended, and the encephalic ganglia placed in the condition of the 'true spinal' or reflex system" (vii., October, 1851).² Dr. Carpenter, in his already-mentioned work, says that the point wherein he differs from Dr. Laycock is in marking out the distinction between the "*sensory-motor*" or consensual actions, which are the manifestations of the reflex action of the sensory ganglia and the "*ideo-motor*" actions, which depend upon the reflex action of the hemispherical ganglia (viii. p. 800). Dr. Laycock, on the other hand, holds that there is no "*essential* distinction" between the sensory and hemispheric ganglia—the intelligent response to stimuli being common to both, quite independently of sensation or consciousness, which "in the so-called *sensational* actions takes no share causally, and is only a coincident phenomenon not necessary to the acts" (ix., 1855, p. 513). They agree, however, in the fact of "unconscious cerebration," as applied to the hemispheres, which Dr. Carpenter thus describes: "Looking at all those automatic operations by which results are evolved without any intentional direction of the Mind to them, in the light of 'reflex actions'

¹ Omitted in recent editions and comprised in Dr. Carpenter's *Principles of Mental Physiology*, published in 1874.

² The statement that "the action of the Will is suspended" differs from the same writer's previous observation, that "the phenomena of Mesmerism are all illustrations of the power of the Will over the brain" (p. 8). To some extent this is accounted for by there being an early or voluntary, and a later or involuntary, stage of artificial somnambulism. No doubt, however, the prominence given by this writer to the action of the Will on the sensorial fibres of the brain, in 1840, has been supplanted, to a large extent, by the fully developed doctrine of the brain's automatic action.

of the cerebrum, there is no more difficulty in comprehending that such reflex actions may proceed without our knowledge, so as to evolve *intellectual products* when their results are transmitted to the sensorium and are thus impressed upon our consciousness, than there is in understanding that impressions may excite muscular movements, through the 'reflex' power of the Spinal Cord, without the necessary intervention of sensation. In both cases the condition of this form of independent activity is, that the *receptivity* of the Sensorium shall be suspended *quoad* the changes in question either by the severance of structural connection or through its temporary engrossment by other objects" (viii. p. 819).

The reader can hardly fail to remark incidentally, from this sketch, how powerful a stimulus has, from time to time, been given to the study of psycho-physical facts by peculiar conditions of the nervous system,¹ artificially introduced, and usually denominated mesmeric. The author believes that this mine is far from having been exhausted, and that, more systematically worked, it will well repay the cerebral physiologist.²

Glancing broadly, in conclusion, at the whole range of psycho-physical phenomena, it is clear that it would be taking a very contracted view of the relations between Mind and Body if we did not include in this relationship a reference to the inseparable *nexus* existing between the two, arising out of the fact that the organ of the mind is the outgrowth and ultimate development of the tissues and organs of which the body itself is composed; that it not only unites them in one common bond, but is, in truth, a microcosm of the whole. It is a fine expression of Swedenborg's (a man who, through all his mysticism and mistiness, recognized some great truths) that the likeness or image of the greatest is represented, as in a mirror, in the least, and of the least in the greatest; and he adds, "Nor can anything be turned over *in the mind* that, if it please, may not be portrayed *in the extremes*, by means of the fibres; for instance, in action by the muscles. . . . There is a likeness of the brain in every

¹ The application of these facts to mental diseases is attempted in my essay entitled "Artificial Insanity," in the *Journal of Mental Science*, April, 1865. See also "Hypnotismus Redivivus," *Idem*, Jan. 1881, and "Mental Condition in Hypnotism," *Idem*, April, 1883.

² This expectation, expressed in 1872, has happily been fulfilled, especially by the experiments made at the Salpêtrière by Professor Charcot, and by Professor Heidenhain at Breslau [1883].

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“Obstupui: subiit cari genitoris imago.”

Imago is used by Plautus to signify the impression made upon a seal—a favorite metaphor for mental images.

The Greek synonym of *imaginatio*, *φαντασία*, from which our words *Fancy* and *Phantasm* are derived, signified the beholding of objects by the power of *Fancy*, or creating new objects by the *Imagination*. Quintilian, interpreting the word as used by Aristotle, says “per quas, imagines rerum absentium ita repræsentantur animo, ut eas cernere oculis ac præsentibus habere videamur.” This is *Hallucination*, answering to our *Phantasm*, and not *Fancy* as now employed, which does not go beyond an exaggerated degree of *Imagination*—creating what is “furthest removed from nature, fact, or sober reality” (Bain).

The *Imagination*, in its broad medical sense, which, when properly understood and guided, is a complex mental power of the greatest interest and importance, must be considered under this section, although passing insensibly into emotional states.

In reference to the difficulty of separating emotional and ideational states of mind, Herbert Spencer takes the case of perceiving a beautiful statue or even an ellipse or parabola, and points out the manifest impossibility of disentangling the cognitive from the emotional element.

With this form of Imagination are closely associated Expectation, Belief, Faith, Imitation, Sympathy, and Hope, some of these states involving the feelings more than others. The most superficial examination of the sense in which the term "Imagination" is employed by metaphysicians on the one hand, and popularly and medically on the other, will reveal the wide difference which exists between the two. In truth, as regards the present inquiry, it signifies, in popular and medical language, that a man imagines certain (bodily) phenomena to have occurred which have not; or it is meant that certain bodily phenomena which really have occurred, owe their existence solely to the influence of his imagination. The signification of the term contained in the first clause is too often assumed to be the whole truth. That of the second clause is almost, if not altogether, lost sight of. Because effects are produced and cures performed by means of a mental condition called the Imagination, it is constantly assumed that these results are imaginary, in other words, that they are "all fancy." This is much to be deplored, and one of the objects we have in view is to dispel, as far as possible, so mischievous an error. It is generally implied that these phenomena are of a merely functional, subjective character, more or less dependent on the state of the mind, more especially the Will, and that a change of mental condition has been naturally followed by a change in the phenomena, although apparently physical. Such is the broad definition of the Imagination as it presents itself to the mind, when employed in reference to medical facts of everyday occurrence. This is what the orthodox medical practitioner means, as he complacently smiles, or is indignant, when the success of his heterodox rival is dinned into his ears, and he asserts that it was all the effect of the Imagination; and, in this sense, he is understood by his assailant. But the fact remains, and because it remains, and cannot be really explained away, it must be explained. The essential must be separated from the accidental, and utilized for therapeutical purposes. It matters little to the patient by what name the remedy is called, whether "Imagina-

tion," or some of the many "pathies" of the day. It is emphatically a case in which "a rose by any other name will smell as sweet." But to the philosophical practitioner it ought to matter a great deal: it ought to be a question of extreme interest.

It is obvious, then, that such signification of the term is widely different from that in which it is employed by metaphysicians and (yet more so) by writers like Mr. Ruskin, who assigns to it a deeper meaning. On analyzing the mental states comprised under the medical and proper use of the term, it will be found that the Attention is strongly directed to a part of the body with which certain phenomena are associated, that the ideas most vividly presented to the mind are in direct relation to them, and that the force of these ideas is intensified by accompanying states of mind already referred to—Expectation, Hope, or Faith. When a person, on swallowing a bread-pill, in the belief that it possesses aperient properties, is purged, it is said to be through his Imagination, the mental condition present yielding, on analysis, a definite direction of thought to the intestinal canal, such leading idea exciting the same peristaltic action as would have been induced by castor oil. The force of this current of thought is augmented by Expectation. In such cases, the fixed idea is that certain phenomena will occur; for example, that there will be pain, or redness of the skin, or loss of muscular power, and should these supervene, we say it is due to the Imagination. This medical use of the term has for its basis that thinking upon an object which, as Dugald Stewart points out, is used by Shakespeare as synonymous with the Imagination, when he speaks of "thinking" on the frosty Caucasus, the "apprehension" of the good, and the "imagination" of a feast. It is the "conception" of Stewart. "The conception of a pungent taste produces a rush of saliva into the mouth; the conception of an instrument of torture applied to any member of the body produces a shock similar to what would be occasioned by its actual application." This is recollective Imagination, and merely involves the presence of a mental image of an object not present to the senses, but in the wider medical use of the word, it becomes, as already stated, more complex, although by no means embracing the Imagination of those metaphysicians, with whom (Stewart, for example) it includes not only conception or simple apprehension, but abstraction, "which separates the selected materials from the qualities

and circumstances which are connected with them in nature, and Judgment or Taste which selects the materials, and directs their combination." To these powers the above-mentioned metaphysician adds Fancy. ✓

Mr. Ruskin pronounces this definition meagre, and says the very point is missed, for Stewart omits from it the power of prophecy, which is the essence of the whole matter. The composition which Stewart regards as Imagination has no part or lot in it. Such a composer only copies the remembered image; with Ruskin it is a penetrating faculty, reading truths, discoverable by no other faculty, as well as a combining associative power which creates new forms, and one which regards simple images and its own combinations in peculiar ways. It is greatly dependent on acuteness of moral emotion. In its highest form, it is "altogether divine," and, out of an infinite mass of things, seizes two that are fit for each other, and are together right, although disagreeable alone. "It is the grandest mechanical power that the human intelligence possesses, and one which will appear more and more marvellous the longer we consider it." It is an operation of mind "altogether inexplicable," and can only be compared with chemical affinity. But it is not necessary to refer further to this aspect of the Imagination; enough has been said to show that the various significations attached to the term must not be allowed to mislead us, and that we are not concerned with the faculty understood in the Ruskinian sense, that in which it is used in reference to the painter, the faculty "necessary for the production of any great work of art." Fancy a country practitioner who has had a truant patient cured by a globulist, and has retorted that he or she was relieved only by the Imagination, being informed that it was by the "power of prophecy;" that the method, so far from being contemptible, was "altogether divine," and, in short, the "grandest mechanical power" belonging to man's intelligence! The only point in which he could agree with Mr. Ruskin would be that it was, indeed, "altogether inexplicable."

This eloquent writer's distinction between Fancy and Imagination is, however, too fine to be omitted. The former he characterizes as "one of the hardest-hearted of the mental faculties, or, rather, one of the most purely and simply intellectual. Fancy is

never serious; Imagination cannot but be serious. Imagination is quiet; Fancy restless." It is with him almost identical with simple conception, for he says "it sees the outside and is able to give a portrait of the outside, clear, and full of detail;" while "Imagination sees the heart and inner nature," though obscure in outer detail. "Fancy plays like a squirrel, in its circular prison, and is happy; but Imagination is a pilgrim on the earth, and her home is in heaven" (xii., vol. ii.). Clearly, however, from a practical medical standpoint, Fancy and Imagination are to be used synonymously.

Returning, now, to the basis of the Imagination, simple *imaging*—for, as we have said, the fundamental element is a psychical representative image—we are concerned with what are ordinarily called ideas which the mind conceives, and which may or may not be actual copies of reproductions of external objects. With ideas as they arise simply from the perception of impressions on the senses, we have not now to deal. As James Mill observes, it is an inconvenience that the word Idea is used with so much latitude of meaning; and, with him, when we employ the term "Ideation" we do so as a general term opposed to Sensation. As sensation may be intensified by various favoring circumstances, so, also, may ideation or imaging acquire intensity from Attention, Desire, Faith, etc., and then we have Imagination in its complex as distinguished from its pure and simple form of imaging. Further, ideation immediately acts upon sensation, as sensation acts upon ideation; and from our present position, it is this and its influence upon motion which constitute such important facts. Mere remembrance of a sensation is, no doubt, in general, greatly inferior in intensity to the original impression on the senses; in fact, differs mainly in this particular; but, as we shall subsequently show, ideation, under certain circumstances, is, in its influence on the sensorium, as powerful as anything, in the outer world, which impresses the senses; and may be really more so, because in the states referred to, there is no disturbing element to distract the attention. Mr. Bain remarks that a certain pleasing remembrance attaches to a good dinner, but how far below the original! We are prepared to maintain, however, that in the above-mentioned states, an ideal dinner would be as pleasing as a real one, so far as present sensation is concerned.

In the example of the fictitious pill, an idea is suggested by it to the mind, which recalls the sensation experienced on a former occasion when a real pill was taken; this central sensation (which is referred to the peripheral terminations of the sensory nerves of the intestines) is reflected on to the motor nerves supplying the muscular walls of the alimentary canal, and they contract in consequence. It is true that in *most* instances, the effect produced would not be so sure, or so great, as when the action of the intestinal muscles is directly excited by purgatives. If, however, the system be placed under the influence of Braidism, the action excited from the centre would be more likely to equal, in intensity, that excited at the periphery.

The various ways in which vomiting may be excited will serve to illustrate the influence of ideas presented in different forms. See how the causes differ. First, a man may vomit from taking an emetic, from a bad smell, or from visceral disease. With this class of cases we have nothing to do; the mind has not influenced the body. Secondly, he may vomit from receiving unpleasant intelligence. Thirdly, by seeing or hearing another person retch; from Sympathy as we say. Lastly, this effect may be induced by the belief that an emetic has been taken; from Imagination, in the ordinary sense of the term current among men. In the second instance, the proximate cause is emotional in character, and does not fall under the present division. In the two succeeding examples, the observations already made as to simple ideas, and ideas around which cluster other mental principles, as Expectation and Belief, so as to form a complex state popularly known as Fancy or Imagination, receive as good an exemplification as we could desire. Belief in an event about to happen was absent in the third, and present in the fourth illustration. How much the effect of even disagreeable things depends upon our knowing that they are so, is shown in every-day experience; and the cause is referred by general consent to the Imagination.

"There may be in the cup
A spider steep'd, and one may drink, depart,
And yet partake no venom; *for his knowledge*
Is not infected; but if one present
The abhorr'd ingredient to his eye, make known
How he hath drunk, he cracks his gorge, his sides,
With violent hefts:—I have drunk and seen the spider!"

(*Winter's Tale*, II. i.)

VSARELLI

Lord Bacon, in his *Natural History*, has a section entitled "Experiments in consort touching the emission of immaterial Virtues from the Minds and Spirits of Men, either by Affections, or by Imaginations, or by other impressions," in which, among a good deal that is fanciful, there are several characteristically acute observations. He defines Imagination as "the re-presentation of an individual thought," and says it is of three kinds: the *first*, joined with belief of that which is to come; the *second*, with memory of that which is past; the *third*, is of things present, or as if they were present. Of these, the first answers to what we have spoken of as Expectation (or Expectant Attention); the second may be illustrated by the effect of the remembrance of a delicious peach in making the mouth water; the third has reference merely to fanciful representation.

The power of the Imagination, Bacon also considered under three heads: first, that exercised upon the body of the imaginant; the second, upon dead bodies, as plants and metals; the third, upon the spirits of men and living creatures. Of these, the first alone is embraced by our survey. Bacon, it may be added, oppressed by the difficulties of the investigation, complains that "the inquisition of this subject in our way, which is by induction, is *wonderful hard!*"

The intensity of Ideas is, as we have said, greatly increased by the belief, faith, or expectation that certain phenomena will occur, and powerfully affects the body for good or ill, according as it is associated with Hope or Fear. Indeed, Hope is usually involved in medical Faith; Fear is not. Both are frequently allied with Expectation and Belief. Expectation is a belief in the future; if of a favorable character, it constitutes Hope; if unfavorable, Fear. Hope and Fear, according to Wundt, are special forms of Expectation, containing an element of the indeterminate; Hope is the expectation of a wished-for event; Fear, the expectation of one not wished for. It is an apt description of this, that Expectation is the hurrying forward of the thoughts into the future. There may be the expectation of a muscular movement, or of a sensation, or that certain organic changes in the direction of health or disease will occur. As the influence of ideas is so largely determined by their hopeful or fearful character, the emotional element will constantly crop up in the consideration of the Imagination,

just as under the head of emotional influence, the illustrations of the effects of Fear must also represent Expectation, seeing that Fear is the apprehension of evil. Bain, who defines the primordial form of Belief as expectation of some contingent future about to follow on our action, holds that James Mill erred, in common with most metaphysicians, in calling it a purely intellectual state. On the other hand, the distinctive character of the belief, from an intellectual point of view, must not be lost sight of, for it is not simply that a fearful Belief will affect the bodily functions, but that the expectation of the form which it will take, will determine, more or less definitely, the particular character of the affection.

When Belief is intense we say there is Confidence; Doubt is excluded and Faith is all powerful. The imagination has risen from a mere idea, image, or conception, to an irresistible conviction; the very mental condition which, from a medico-psychological point of view, is the *desideratum* in undertaking the treatment of diseases admitting of amelioration from the psychical method. The word Imagination is sometimes employed in too comprehensive and lax a way, and the emotions are made to enter into its composition to an unwarrantable extent. This is, perhaps, more particularly the case when its evil rather than its beneficial aspect is dwelt upon. The old French Commission on Animal Magnetism, for example, observe, "As to the Imagination, we know the derangement which a vivid and sudden impression has often occasioned in the human machinery. The Imagination renews or suspends the animal functions; it animates by Hope or freezes by Fear; in a single night it turns the hair white; in a moment it restores the use of the limbs or the speech; it destroys or develops the germ of diseases; it even causes death."

There are two terms frequently made use of, to which it will be convenient to refer here—Sympathy and Imitation.

Fundamentally identical, the former, both in etymology and usage, refers especially to Feeling, while the latter is employed in relation to Action. There is the sympathy with both forms of Feeling—the mental and the sensational. The influence upon sensation of a mind *en rapport* with another mind illustrates both effects. One who sympathizes strongly with another who is suffering from bodily pain, is very likely to experience it himself. The emotional element usually enters strongly into this condition,

but there may be what is termed sympathetic pain, when the knowledge, abstract idea, or conception is alone sufficient to induce corresponding bodily sensations, without any excitement of emotional sympathy. At this point it really merges into Imitation. For with both it is this knowledge or apprehension of another person's state which, more or less involuntarily, causes similar actions, as expression, gesture, and the tone of the voice. A vivid image of a phenomenon occurring to another is formed in the mind. This is reproduced in the spectator. The event is in accordance with the general law now under consideration. If John gapes when he sees Thomas gape, it is because the idea is forcibly presented to his mind, and thus produces analogous acts. The idea is in this case excited through the sense of sight or of hearing; but it may be suggested in other ways, as when John simply thinks of the act and the same effect is produced, as has happened to myself from writing this sentence. Here we meet the additional principle, that whatever mental or bodily state can be excited through the senses from without, may arise from within, from Imagination proper. All these sympathies come into play when we only imagine ourselves, as well as when we are really acting on the stage of life. It is this principle, well known to psychologists, but so often overlooked by the public, which continually turns up in the consideration of the questions now engaging our attention; and both principles united serve to form a clue to many, otherwise inexplicable, bodily manifestations, the effects of mental states. Imitation is closely allied with phenomena popularly referred to the Imagination; with those astonishing psychological dramas which have at various epochs arrested the attention of the world. To this remarkable principle of our nature which leads us to act involuntarily like others, the convulsions and faintings, which, in sensitive persons, follow the witnessing of these conditions, are due. As regards the Imagination and Imitation, while so closely allied from this point of view, the philosopher sees in these states antagonism rather than relationship. He perceives that the Imagination expands and indefinitely extends the objects of perception or thought; while Imitation merely reproduces and is limited by the boundaries of actual facts. The Imagination, if it does not create, combines old forms until new ones arise; the Imitative faculty does not invent, it only

copies. They bear, in this aspect, the same relation to each other that the painter and the engraver do. Both are essential to the well-being of the individual and the community. Without Imagination the world would be a desert, devoid of even its mirage; a barren present without future hopes. Without Imagination the lover and the poet, according to a high authority, could not exist. Without Imitation the child could not grow into the man. Without Imitation the acts of daily life, known as "habits" originating in unconscious mimicry and heredity would be fresh inventions or discoveries in each individual. From our present practical standpoint, however, Imitation is rather the result of an idea excited by sensorial impressions or the imagination. It involves a reflection or bodily counterpart of a mental image. When people say that a hysterical girl has her imagination vividly impressed by the contortions of a patient, and becomes similarly affected, the psychologist affirms that a vivid image was excited in the mind, and that, by the law already laid down in regard to Imitation or Sympathy, the spectator's body assumes the same state as that of the patient. The physiologist's mode of expressing the like event, is that the idea excited by the scene, passed from the hemispheres down to the motor ganglia and nerves, and so a corresponding ideo-motor act resulted.

In concluding this Section it may render the relation between Sensation and Ideation clearer to employ a familiar illustration. I perceive an object, the sun, for example. An image is formed on the retina, which is transmitted by the optic nerves to the brain. These processes insure sensorial perception, or object-consciousness. But there is more than this; there is a mental impression, involving subject-consciousness. The condition of my mind when I perceive the sun, may be considered to involve ideational as well as (though excited by) sensorial changes; including, in short, the mental state, which, as an idea, remains after the external object or stimulus is withdrawn. A change has been induced in the gray matter of the hemispheres by the upward action of the sensory ganglia excited by impressions from without, so that we have three distinct though continuous portions of the nervous system acted upon; the peripheral expansion of the optic nerve on the retina, the corpora quadrigemina, and the hemispherical centres.

After ceasing to perceive the sun, I retain, then (apart of course from the spectrum which may remain for a short time after closing my eyes), a state of mind in relation to it which constitutes an idea—the immediate result of an external object, one which passing away from the consciousness may become latent. This by active Memory or recollective Imagination may be recalled, or by creative Imagination may be united with other ideas and formed into one mental image. The vexed question of the nature of the recollection of sensations, in idea, will be referred to in the next Chapter.

CHAPTER II.

INFLUENCE OF THE INTELLECT ON SENSATION.

Section I.—Æsthesia.

THE Intellect may excite ordinary Sensation (æsthesia), which in addition may be either excessive (hyperæsthesia) or diminished (anæsthesia), while it may also induce perverted sensation (paræsthesia), which, when painful, constitutes dysæsthesia.

The terse, but comprehensive expression of John Hunter, which has already been cited, contains in a nutshell the principle which underlies the greater part of the phenomena referred to in this chapter. "*I am confident that I can fix my attention to any part until I have a sensation in that part.*" Müller expresses the influence of the ideational upon the sensational centres in equally clear terms. "Ideas do not act merely on the motor apparatus by which they are expressed; they as frequently affect the organs of sense, which then present sensorial impressions or images of the ideas." Among other proofs he gives the instance of a person's teeth being set on edge by witnessing another about to pass a sharp instrument over glass or porcelain; also the production of shuddering by the mentioning of objects which, if present, would excite that sensation; that is, by recollective Imagination. "I cannot think of seeing a slate rubbed with a dry sponge," remarks Herbert Spencer, "without there running through me the same thrill that actually seeing it produces." The idea of a piece of blanket in the mouth affects one of my friends in a similar but more marked way.

If twenty persons direct their attention to their little fingers for five or ten minutes, the result will be something like this: A few will be unconscious of any sensation in this member; some will experience decided sensations—aching, pain (dysæsthesia), throbbing (hyperæsthesia), etc.; and the majority will feel a slight sense of weight (æsthesia) and tingling (paræsthesia). This simple experiment raises several questions, as, Might sensations

always be felt in the part from the changes which are constantly going forward in the tissues, but are unobserved except when the attention is directed to them? Or, does the act of Attention excite increased vascularity of the sensory ganglia and cause subjective sensations? Or, lastly, do the sympathetic centres become excited, and the vaso-motor nerves influenced, so as to cause temporary vascular changes in the finger which involve sensation? The first supposition does not seem probable, except to a very slight extent. If correct, we should always feel some sensation in the finger when consciousness is directed towards it. We think both the remaining suppositions have weight. Probably the feeling experienced is partially subjective; but we believe there is a real effect produced upon the finger if Thought is sufficiently long directed to it, and that these vascular changes are felt in the form of throbbing, weight, etc.¹ Other changes are more likely to be subjective.

Mr. Braid tells us in his little book on *Hypnotism* (xx. p. 93), that he requested four gentlemen, in good health, and from forty to fifty-six years of age, to lay their arms on a table with the palms of their hands upwards. Each was to look at the palm of his hand for a few minutes with fixed attention, and watch the result. Entire silence was enjoined. What happened? "In about five minutes, the first, one of the present members of the Royal Academy, stated that he felt a sensation of *great cold* in the hand; another, who is a very talented author, said that for some time he thought nothing was going to happen, but at last a *darting, pricking* sensation took place from the palm of the hand, as if electric sparks were being drawn from it; the third gentleman, lately mayor of a large borough, said that he felt a very uncomfortable sensation of heat come over his hand; the fourth, secretary to an important association, had become rigidly cataleptic, his arm being firmly fixed to the table."

It would be difficult to determine in these instances by what train of thought these different results came to pass; whether each imagined that such and such effects would be produced by the process, or whether an accidental condition of the hand at

¹ This view is confirmed by the fact that if a part which is the object of close attention is held firmly in one position, the display of muscular energy is accompanied by vaso-motor dilatation in this portion of the body (see Gaskell in the *Journal of Anatomy and Physiology*, xi. (1877) p. 720).

the moment, caused certain very slight suggestions, which were intensified by the Attention directed to them. Probably the former; but one thing is certain, that had Mr. Braid suggested other effects, instead of preserving silence, the character of the sensations would have been greatly modified.

Section II.—Hyperæsthesia.

It is unnecessary, under this head, to do more than to refer in illustration to the notorious fact that the expectation of the pain of an actual blow on any part of the body greatly intensifies it. It is, in short, the converse of the other truth that pain is not felt, or only slightly felt, when the Attention is directed in a different channel.

Section III.—Anæsthesia.

Insensibility to bodily pain, artificially induced, without drugs and solely by psychical means, is a most interesting and important fact, and would require a chapter instead of a few paragraphs to do it justice.

The simplest example of anæsthesia due to intellectual conditions, occurs when the Attention is so powerfully arrested in a certain channel that the application of a painful stimulus to the body is not observed. The writer was on one occasion about to have a tooth extracted under the influence of laughing gas, when, in consequence of an unlooked-for *contretemps*, the dentist was unable to administer it. The extraction was therefore performed without it, but the operation was rendered almost painless, by the writer vividly imagining pleasant ideas, and mentally repeating to himself, "How delightful! how delightful!"

In January, 1833, there was a young woman, Elizabeth H., a patient at Guy's Hospital, who was found by the house-physician, Mr. Price, to be readily susceptible to the effects produced by directing her attention for a few minutes to a bright object. In this state I found that any part of the limbs became anæsthetic or sensitive according to the idea impressed upon her. When we pricked her arm with a pin she did not in the first instance indicate any sense of pain, but when we impressed upon her

mind that the pricking was painful she manifested the usual indications of pain. When, on the contrary, the idea was immediately impressed upon her that the proceedings would not hurt her, the part pricked was at once entirely anæsthetic. This experiment was repeated several times. She had no recollection of it when aroused.

A young lady, who was about to be operated upon by Mr. J. G. Thrupp under the influence of ether, fell into a condition simulating the effects of etherization. Three and a half years before, ether had been administered to her, on account of the removal of teeth, and previous to the return of sensibility she laughed and cried in a hysterical manner. On November 30, 1882, Mr. Thrupp held, for a second or two, some ether about three inches from the patient's mouth. Scarcely had she recognized the smell than the eyelids quivered rapidly, there was convergent strabismus, the face became congested and assumed the purple hue common in the early stage of anæsthesia. Violent trembling of the upper and lower limbs followed, succeeded by strong convulsive struggles, and at last complete flaccidity of the muscles, with heavy breathing. The sensibility was blunted, so that the edge of the upper eyelids could be touched without inducing reflex action¹ (xlvi., December 23, 1882).

I am indebted to Mr. Woodhouse Braine, who has had large experience in administering anæsthetics at the Charing Cross Hospital, for the following striking cases of imaginary or psychical anæsthesia.

"During the year 1862 I was called upon," writes Mr. Woodhouse Braine, "to give chloroform to a very nervous and highly hysterical girl, who was about to have two sebaceous tumors of the scalp removed. On going into the operating theatre, it was found that the bottle containing the chloroform had been removed to the dispensary, and on testing the Snow's inhaler, which at that time I was in the habit of using, I found it to be quite devoid of even any smell of chloroform. Then, having sent for the bottle in order to accustom the girl to the face-piece, I applied it to her face and she at once began to breathe rapidly through it. When she had done this for about half a minute she said, 'Oh I feel it,

¹ When ether was actually administered, the patient became sensible, and insensibility was with difficulty reinduced with seven ounces of ether. It seems a pity not to have operated during the continuance of the mental anæsthesia.

I feel I am going off,' and as the chloroform bottle had not arrived, she was told to go on breathing quietly. At this time her hand, which had been resting across her chest, slipped down by her side, and as she did not replace it, I thought I would pinch her arm gently to see the amount of discomfort her hysterical state would induce her to bear. She did not notice a gentle pinch, and so I pinched her harder, and then as hard as I could, and to my surprise I found that she did not seem to feel at all. Finding this was the case I asked the operator to begin, and he incised one of the tumors, and then, as the cyst was only slightly adherent, pulled it away. At this time I had removed the face-piece, and wishing to see the effect of her imagination, I said to the operator, who was going to remove the second tumor, 'wait a minute, she seems to be coming round.' Instantly her respiration, which had been quite quiet, altered in character, becoming rapid as when I first applied the inhaler, and she commenced moving her arms about. I then reapplied the face-piece and her breathing again became quiet, and she submitted to the second operation, without moving a muscle, and when the water dressing and bandages were applied, in answer to the question, as to whether she had felt anything, she said, 'No, I was quite unconscious of all that was done,' and to the time she left the hospital she firmly believed in the potency of the anæsthetic which had been administered!

"Exactly ten years later, that is, in 1872, I met with a similar case. On June 16, 1872, Kate Levy, aged 20, came to the Dental Hospital of London to have some carious teeth extracted, but as more than one sitting was deemed necessary, it was proposed to remove the two most painful and difficult teeth, and then order her to come again. This patient like the last was of a very hysterical temperament, but had nitrous oxide administered without any difficulty, and the extractions were performed; when she came to herself, she refused to sit up in the chair, or to push the piece of wood from between her teeth (where it had been placed for the purpose of keeping her mouth open), that is she remained perfectly motionless, not taking any notice of surrounding objects, and not doing anything she was told to do. That she was conscious I knew by the expression of her face, by the quivering of both eyelids, and by the reflex action which immediately ensued on touching the conjunctiva. I therefore said to the operator,

'Well, if she is still unconscious there will be time to remove another tooth,' for eleven teeth and roots had to be extracted, and to my surprise, this was done without any apparent suffering. I then remembered the previous case, and said to the operator 'Now she is coming round.' She thereupon opened her eyes, sat up, and recovered in the usual way that patients do. She came again on June 21st, and wishing to try the influence her imagination had on her sensibility, I determined to administer air only. She breathed this for a few seconds, and on my calling the pupils' attention to her mode of quiet breathing, she began to inhale the air more deeply, and then, on my giving her the cue by saying to the pupils present, 'Now, you see, when I lift up her hand, and then let it go, it will fall heavily,' it turned out as was predicted; then saying, 'Now, you will find she will breathe rapidly and then cease to feel pain, although she will know something is being done,' I removed the face-piece. The operator then commenced his extractions, removed four teeth, and in the hospital note-book it is written by Mr. T. H. G. Harding, who was the surgeon on duty that day: 'Note.—The patient breathed air only through the inhaler; one firm tooth, two firm stumps, and a temporary tooth extracted; said she felt no pain, but felt the teeth coming out—a well-marked case of hysteria. H. H.' This patient again came, by order, on June 29th, and on several other occasions, when air only was administered, and each time the same psychical anæsthesia was apparent."

No one who has studied the history of anæsthetics¹ in all forms, doubts that, whether by inducing a profound and peculiar kind of sleep, or by merely rendering the patient insensible to sensorial impressions related to a certain idea or train of ideas, severe as well as trivial operations may be performed without any pain. A few words on anæsthesia, especially in connection with Dr. Elliotson and Mesmerism, may not be out of place here.² A passage in Sir John Forbes's *British and Foreign Medical Review*, on its employment in surgical operations, is now of real

¹ It is a remarkable fact that in all, or nearly all, histories of anæsthetics, *psychical* anæsthetics are not even mentioned. Yet they preceded drug-anæsthesia, and to a large extent suggested it. Cloquet removed a woman's breast, during the mesmeric sleep (she being able to converse, but insensible to pain), so far back as 1820. It is said that no fatal case from psychical anæsthesia has occurred.

² *Vide* remarks by the writer on the occasion of Dr. Elliotson's death, in the *Medical Times and Gazette*, August 29, 1868.

historical interest, and the period which it marks ought not to be overlooked by any one who undertakes to write a complete history of anæsthetics. Four years before (in 1842) at a discussion at the Medical and Chirurgical Society, on an operation performed without pain under the influence of Mesmerism (so-called), a distinguished member of the profession, the late Dr. Copland, asserted that the fact was unworthy of the Society's consideration, because pain is a wise provision of nature, and patients are all the better for it, and recover more quickly!

In 1843 appeared Dr. Elliotson's well-known work, *Numerous Cases of Surgical Operations without Pain in the Mesmeric State*. Then after the lapse of a few years, a large number of capital operations in various countries (especially in India by Dr. Esdaile) having been painlessly performed, a considerable change of opinion evidently took place, and Sir John Forbes, in his *Review* for October, 1846, thus writes: "Indeed, we hesitate not to assert that the testimony is now of so varied and extensive a kind, so strong, and, in a certain proportion of cases, so seemingly unexceptionable, as to authorize us—nay, in honesty to compel us—to recommend that an immediate and complete trial of the practice be made in surgical cases." But scarcely had this number of the *Review* appeared, when the first operation under the influence of ether was performed in America! This was on October 16th, and the news reaching England on December 17th, the discovery was announced in the *Medical Gazette* of the 18th, under the head of "Animal Magnetism Superseded," and on the following day Liston operated for the first time upon a patient under its influence. It was soon seen that many phenomena, such as partial consciousness, calling out as if in pain, and sensitiveness to slight touch, were quite consistent with perfect insensibility to pain (analgesia) and were not, as many had supposed when they occurred in mesmeric patients, proofs of imposture. Now, Dr. Elliotson and his opponents were both right and wrong—he wrong in asserting that Mesmerism would be the anæsthetic ultimately adopted by the profession, but right in his belief that operations had been painlessly performed under its influence; however its mode of action be explained. We can but smile now at the objection already referred to, raised—much flippancy against the prevention of pain; possibly rather to blush that members of our profession sh

ground, have opposed the noble attempt to introduce painless operation in surgery. Perhaps the prejudice was not more singular than that of the esteemed Editor of *Chelius* against the employment of ether, for he wrote, in 1847, "I have considerable doubt of the propriety of putting a patient into so unnatural a condition as results from inhaling ether, which seems scarcely different from severe intoxication, a state in which no surgeon would be desirous of having a patient who was about to be submitted to a serious operation" (lxii., II. p. 1009).

The Marquis of Dalhousie wrote in 1856, June 27, in reference to Esdaile's psychical anæsthetic: "Of the efficacy of it in surgical cases I am able to speak with confidence. Dr. Esdaile undoubtedly did possess the faculty of so influencing the sensations of natives of India by means of mesmerism as to reduce them to a state of insensibility not less complete than that which is now produced by the use of chloroform. While they were in that state of insensibility he performed upon them surgical operations of every kind; many of them tremendous in their magnitude, duration, and severity. Those operations were performed without any apparent consciousness in the patient, without pain to him, and usually with great success."¹

Dr. Esdaile, in his *Introduction of Mesmerism (with the sanction of the Government) into the Public Hospitals of India* (2nd edit., 1856), records 261 operations performed by him in the hospitals of Hooghly and Calcutta, rendered painless by mesmerism. Of these, 200 consisted of the removal of large tumors from 10 pounds to 103 pounds in weight. In a hospital called the Subscription Hospital there had also been eighty-four capital operations performed under the same influence. In addition to these 345 operations, smaller ones were performed, as teeth extraction, application of nitric acid to large wounds, abscesses opened, etc.

There were 14 deaths out of 261, but in no instance was death caused by the operation.

¹ Lord Dalhousie states that he appointed Dr. Esdaile in 1848 to be one of the Presidency Surgeons in acknowledgment of the services he had rendered to humanity, and in order that he might be able to continue his services at the capital (Calcutta).

Section IV.—Paræsthesia.

The individual under the influence of Braidism, persuaded that he is in danger of being lost in the snow, shivers with imaginary, but to him no less real, cold. Adopting the expression which the Tichborne trial has rendered so proverbial, we may say that Shakespeare would have been "surprised to learn" that a man might be able to hold a fire in his hand and yet fancy himself cold by thinking on the frosty Caucasus, and, conversely, might be able without feeling chilly to

"Wallow naked in December snow,
By thinking on fantastic summer's heat;"

for a central sensation of ideal or subjective origin, can supplant the sensation derived from a peripheral impression, since the antithesis suggested (being more powerful in proportion to the original stimulus) would occupy that portion of the cortex habitually connected with simple sensation and thus a kind of local hypnotism result.

Professor Gregory reports one of those frequent cases in which, by suggestion, "the subject" experiences a variety of sensations. "One arm was deprived of sensation, or both arms, or the whole frame. He was made to feel a knife burning-hot, and the chair on which he sat equally so. When he started up he was made to feel the floor so hot that he was compelled to hop about, and wished to pull off his boots, which burnt him. He was made to feel the room intolerably warm, and actually perspired with the heat; after which he was made to feel it so cold, that in a minute or two he buttoned his coat, and walked about rubbing his hands. In about five minutes his hand was really chilled, as I found, like that of a person exposed to frost" (xix. p. 353).

Mr. Braid, in investigating the alleged discoveries of Reichenbach in regard to the Od force, found that in nearly all cases, even when the persons had not been hypnotized, drawing a magnet or other object slowly from the wrist to the point of the fingers produced various effects. Among these were "a change of temperature, tingling, creeping, pricking," while, when he reversed the motion, "it was generally followed by a change of symptoms from the altered current of ideas then suggested. Moreover, if any

idea of what might be expected existed in the mind previously, or was suggested orally during the process, it was generally very speedily realized. The above patients being now requested to look aside, or a screen having been interposed so as to prevent their seeing what was being done, if they were requested to describe their sensations during the repetition of the processes, similar phenomena were stated to be realized when there was nothing whatever done beyond watching them, and noting their responses." His son, Dr. Braid, who assisted his father in his experiments, remarks in a letter to the author a few years ago, "certainly the first results would have misled any one who was not accustomed to sift such matters."

When visiting the Crystal Palace some years ago, it struck the writer that the man who then had charge of a galvanic battery, could tell something about Imagination. I was not mistaken, for he assured me that very often when a lady had grasped the handles of the machine, she remarked on the peculiar sensations she experienced, and quite thought she was being galvanized, although he had not put the battery in action. But it is a fact, perhaps equally deserving of notice, that such subjective impressions may, as in the present instance, have a limit to their operations, for the galvanist stated that he had never observed any twitching of the hands from these imaginary shocks.

The thought of any material which actually sets "the teeth on edge" may cause this or allied sensations¹ of discomfort and even muscular movements. Of course the sensitiveness to particular things, in consequence of heredity or of an individual and accidental association of a particular surface with certain sensations, varies greatly. The mere recalling of the fruit must have induced decided sensations in such a family as that mentioned by Prosper Lucas, to the members of which the mere sight of a peach was intolerable, producing "une sensation de frémissement interne et d'horripilation." Hence it was necessary to prepare their peaches for them with the skin carefully removed. (Vide *Traité Philosophique et Physiologique de l'Hérédité Naturelle*, i. 481.)

¹ See pages 56-7.

Section V.—Dysæsthesia.

Then as to actual pain caused by mental states, Sympathy, Expectation, etc., the most familiar instance is that of toothache, or *tic-douloureux* occasioned in this manner. Burton quotes from Dr. Cotta's *Discovery of Ignorant Practitioners of Physick* two examples of what "Phansie is able to do; the one of a parson's wife in Northamptonshire, anno 1607, that coming to a physician, and told by him that she was troubled with the *sciatica*, as he conjectured (a disease she was free from), the same night after her return, upon his words, fell into a grievous fit of a *sciatica*; and such another example he hath of another good wife, that was so troubled with the *cramp*; after the same manner she came by it, because her physician did but name it" (xlviii. p. 169).

Lauzanus records the case of a young man who watched with great attention a priest being bled from the arm for an attack of pleurisy. Two hours afterwards he experienced a severe pain in his own arm, at the spot corresponding to that of the puncture, and did not get rid of it for a couple of days (lx. p. 154). This is a fair instance of the primarily neuralgic class of cases, caused by a stimulus acting centrally upon the sensory nerves. In this and the following case it is impossible to say how far emotional excitement assisted the result.

Gratiolet (xv.) relates that a law student who was present for the first time in his life at a surgical operation, which consisted in removing a small tumor from the ear, felt at the same instant so acute a pain in his own ear that he involuntarily put his hand to it and cried out. Gratiolet, who himself witnessed the circumstance, does not state whether the affected ear corresponded to that upon which the operation was performed, but this is implied. This case forms an excellent illustration of simple pain caused by what is popularly understood as "Sympathy," a fellow feeling, which might well bring it under the category of emotional influence.

Section VI.—Sensation from Association of Ideas in accordance with the Law of Contiguity.

Instances abound of physical effects resulting from the operation of this law. A man, at a previous period has had the

presented to his mind as that now present, and with it there was associated a particular sensation. With the recurrence of the idea arises the formerly associated sensation, unless the latter has been too faint to induce the necessary cohesion or "polarization."

Dr. Kellogg records, in the *American Journal of Insanity*, the case of a friend of his who informed him that he had frequently sailed, when young, in a steamboat across an arm of the sea which was rough, and in consequence often suffered from sea-sickness. Upon this boat was an old blind fiddler who did his best to alleviate the sufferings of the passengers with his violin. The result was that this instrument became associated in his mind with sea-sickness, and for years he could never hear it without experiencing sensations of nausea or a sort of *mal de mer*. Van Swieten's case of vomiting, which will be given under involuntary muscular action, might also be, as correctly, cited here.

Gratiolet (xv. p. 297) relates of himself that when a child his sight became affected, and he was obliged to wear spectacles. The pressure which their weight exerted upon the nose was so insupportable that he was obliged to discontinue their use. Writing twenty years after, he says that he never sees any one wearing spectacles without instantly experiencing, very disagreeably, the sensation which had so much disturbed him as a boy.

Mr. J. W. Clark, formerly of the Royal Indian Engineering College (Staines), informs me that he was severely burnt in consequence of an explosion in a hot oil bath. Ever since the accident, now some years ago, the smell of hot oil has always been productive of a feeling of nausea. A slight burn from ether vapor (also about the head) caused a similar, though much less marked, sensation to become associated with it.

Section VII.—Special Senses.

In regard to the *special senses*, the influence of the Mind is notorious. If any one prefers to consider the senses under the term Mind, he has but to suppose that we are illustrating the influence of one group of mental faculties over another group, instead of that of Mind over Body. All we maintain is that the psychical state—the condition of the cerebral hemispheres—may play upon the sensory centres so as to produce certain sensorial

phenomena, and also that it may so affect the sensorium that impressions upon the senses received from the outer world may be modified in various ways. We cannot adopt Hunter's mode of expression, "the idea of a sensation is supposed to be the sensation itself," for there is a sensation, although subjective. When there is actual hallucination, we may say that the idea of a sensation, having induced such intensity of action of the sense-ganglia as to cause the same effect as if excited by a material object, is supposed to be a sensation caused by an objective impression.

(a) OLFACTORY.—The influence of the Imagination (in its expective form) upon the olfactory sense is well exhibited in a case reported by Professor Bennett, of Edinburgh (xviii. p. 15):

"A clergyman told me that some time ago suspicions were entertained in his parish of a woman who was supposed to have poisoned her newly born infant. The coffin was exhumed, and the procurator fiscal, who attended with the medical men to examine the body, declared that he already perceived the odor of decomposition, which made him feel faint, and in consequence he withdrew. But on opening the coffin, it was found to be empty, and it was afterwards ascertained that no child had been born, and consequently no murder committed."

(b) OCULAR.—There is a striking observation made by St. Theresa, whom M. Maury characterizes as the metaphysician of feminine mysticism and of ecstatic illumination, namely, "I have known some of weak mind who imagine they *see* all that they *think*, and this," she adds, "is a very dangerous condition." One practical reflection may, in passing, be made upon the ecstasies to whom she refers. It would be much more difficult to believe in the credulity of the saints and mystics, if we did not see ample physiological reasons for believing that the senses were really acted upon by their intense thought on certain spiritual subjects. They knew nothing of the action of Expectation or Imagination upon the sensorium.

In cases where actual visions are described as occurring, while we do not think it necessary to assume more than an excitement of the sensory ganglia, Müller would have held that there was an image impressed on the retina excited by internal instead of, as normally happens, by external stimuli.¹ In his section on the

¹ Müller says, "The process by which phantasms are produced is the reverse of which the vision of actual external objects is due. In the latter case par-

"Influence of the Mind upon the Senses," he objects to the term hallucination being applied to such experience, because it implies that the phantasm is a mere idea, instead of being truly a sensation. This objection is, of course, equally forcible whether we regard the retina (in the case of vision) or the optic centres, as the seat of the phenomenon.

Müller's remark, when referring to those cases in which extirpation of the eye coexists with phantasms, that they "prove that the presence of the retina is not a necessary condition for the production of such phenomena, but, on the contrary, that the deeper seated parts of the essential organ of vision are alone required," is an admission sufficient to allow of all other instances of spectral phenomena from subjective causes being referred to the sensory ganglia and central nuclei of the optic nerve.

Unusually vivid sensations from external objects occasioned by cerebral excitement at the time will, as we have frequent proofs, remain, or be easily recalled, long after the original impression was received. This was strikingly shown in the experience of one of the survivors of the unfortunate "London." When escaping from the wreck, in the boat, he would sometimes be baling out the water and half asleep at the same time. When in this state he could always see a vessel before him with her stern under water, her jib-boom and foretopmast gone, and her foresail flapping in the wind. "It was the 'London' as she last appeared to me. At any time, during the night if I were to close my eyes, if only for a second, the ship was always before me *in this form*." And after being picked up by the barque next day, and able to have some sleep, he says, "and a troubled sleep it was. I passed through all the horrors of another shipwreck; and for many nights after, and I may say many weeks after, I had to go through the same ordeal." The intensity of the impression derived from witnessing the shipwreck impressed so vivid an image on the optic perceptive centre that whether sleeping or waking, there was a constant flow of energy from the sensory to the ideational centres of the cortex.

ticles of the retina thrown into an active state by external impressions, are conceived in that condition by the sensorium; in the former case, the idea in the sensorium excites the active state of corresponding particles of the retina or optic nerve" (iii. p. 1391). He adds that the action of an idea upon the organ of vision, so as to produce a corresponding sensation (*spectre*) is not more remarkable than the ordinary function of sight by which an idea of an object is produced.

The simplest example, perhaps, which can be adduced of the influence of Attention upon the sensory ganglia, is the act of recalling a visual impression, even after a long interval of time. Thus, Sir Isaac Newton, in a letter to Locke (xxxi. I. p. 40), describes how he once looked a short time at the sun in a mirror, and then turned his eyes into a dark corner of his room till the spectrum vanished, repeating the experiment three times. The third time he found to his amazement, when the light and colors were almost gone, that they began to return "by intending his fancy upon them," and became as vivid as when he had just looked at the sun, but if he ceased "to intend his fancy" upon them, they vanished again. "After this," he says, "I found that so often as I went into the dark and intended my mind upon them, as when a man looks earnestly to see anything which is difficult to be seen, I could make the phantasm return without looking any more upon the sun, and the oftener I made it return, the more easily I could make it return again." At last he brought his eyes "to such a pass" that he had to shut himself up in a dark room for three days together "to divert my Imagination from the sun; for if I thought upon him I presently saw his picture though I was in the dark." By this method, and employing his mind about other things, he began in a few days to have some use of his eyes again. Yet for some months after, "the spectrum of the sun began to return as often as I began to meditate upon the phenomena even though I lay in bed at midnight, with my curtains drawn." When Newton wrote this interesting account to Locke, he said he had been several years very well, but he thought that he could recall the spectrum "by the power of his Fancy," if he durst try. He adds, that such an occurrence involves a question "about the power of Fancy," which he confesses is "too hard a knot for me to untie," but inclines to refer it to "disposition of the sensorium to move the Imagination strongly, and to be easily moved, both by the Imagination and by the light, as often as bright objects were looked upon." Another remarkable observation was made by Newton in this case. He had only looked at the sun (in the mirror) with his right eye, yet he found that "my Fancy began to make an impression on my left eye as well as upon my right," and he could see the spectrum of the sun if he did but intend his Fancy a little while upon it. So that here the powerful direction of Thought or Attention pro-

duced the same effect on the left eye, or a point in the corresponding optic perceptive centre, as that of the sun itself upon the right eye.

The following, related by Sir B. Brodie, is a case in point:

"A gentleman of my acquaintance, of a very sensitive and imaginative turn of mind, informed me that not infrequently when he had his thoughts intensely fixed for a considerable time on an absent or imaginary object, he had at last seen it projected on the opposite wall, though only for a brief space of time, with all the brightness and distinctness of reality" (xxx. p. 84).

A man has his mind so far awake during sleep as to dream of a figure; either one which has impressed his retina and sensorium, or which he never saw, and is the product of his Imagination. That the highest sensory centres have been in activity, as well as the lower optic ganglia is indicated by the occasional persistence of the phantom after waking from the sleep in which the dream has occurred, since this necessitates memory.

The next case given by Brodie illustrates these remarks. He adduces it as a proof that in visions connected with our dreams, there is something more than what occurs in the instance of objects ordinarily presented to our minds by Memory and Imagination. What this "more" consists of is not decided by Brodie, and its decision must depend upon whether we hold that in the operation of these faculties the same brain-tracks (sensory centres) are excited as in the production of actual phantoms, the only difference being one of intensity; or, that the cerebral hemispheres only are in operation. "A friend of mine, on awaking in the morning, saw standing at the foot of his bed a figure in a sort of Persian dress. It was as plainly to be seen, and as distinct, as the chairs and tables in the room, so that my friend was on the point of going up to it, that he might ascertain what, or rather who, it was. Looking, however, steadfastly at it, he observed that, although the figure was as plain as possible, the door behind it was plainly to be seen also, and presently the figure disappeared. Considering the matter afterwards, he recollected that he had had a dream in which the Persian figure played a conspicuous part; and thus the whole was satisfactorily explained, it being evident that the dream, as far as this part of it was concerned, had continued after he was awake, and that the perception of the

imaginary object had existed simultaneously with that of the real ones."

The physiologist Gruithuisen had a dream, "in which the principal feature was a violet flame, and which left behind it, after waking, for an appreciable duration, a complementary image of a yellow spot" (xliv. p. 144).

The remarkable power possessed by some persons of seeing visual images, especially numerals, has been worked out by Mr. Galton in the most interesting manner since the first edition of this work was published. Thus, for example, Mr. Bidder, Q. C., in performing extraordinary feats of mental calculation, can refer to certain visual numerals vividly depicted in his sensory centres in a definite and orderly manner. It has been found by Mr. Galton that a large number of persons, about one in thirty, possess the same faculty in different degrees of power, and under different forms. Its hereditary character is strikingly exhibited in the case of Mr. Bidder, as his father, the celebrated "calculating boy," availed himself of the like numerical register to which he could direct his attention, and the son of Mr. Bidder, Q. C.; has a similar power—three generations in all.¹

The readers of Scott's *Demonology and Witchcraft* will remember a remarkable example of spectral illusion cited by him from Peter Walker's *Lives*, occurring on the banks of the Clyde in 1686. In this instance, a great many persons saw, while others failed to see,² companies of men in arms marching along and disappearing; also bonnets, guns, and swords. The narrator says that a gentleman near him called out "All you that do not see, say nothing; for *I persuade you, it is a matter of fact, and discernible to all that are not stone-blind!*" And he proceeds: "Those who did see told what locks the guns had, and their length and wideness, and what handles the swords had, whether small or three-barred, or Highland guards; and the closing knots of the bonnets, black or blue; and those who did see them there, *when-ever they went abroad, saw a bonnet and a sword drop in the way*" (p. 15, Ed., 1876). He estimates the proportion who could see these objects at two-thirds.

¹ The reader will find Mr. Galton's paper on "Visualizing Numerals" in *Nature* for January 15, 1880. See also his *Inquiries into Human Faculty and its Development*, 1883.

² Had *all* seen these figures, we should have referred the phenomenon to a mirage, but as a fact one-third—the unimagative—could see nothing.

Nicolai's experience (without any suggestion from without) forms an excellent parallel, and certainly could not be explained by mirage. "I saw several times people on horseback, dogs, and birds. All these phantasms appeared to me in their natural size, and as distinct as if alive, exhibiting different shades of carnation in the uncovered parts, as well as in different colors and fashions in their dresses, though the colors seemed somewhat paler than in real nature. None of the figures appeared particularly terrible, comical, or disgusting, most of them being of an indifferent shape, and some having a pleasing appearance" (xxvii. vol. vi.).

George Combe says, in his *Life*, that when he was a boy, he was present at an execution, and, he observes, "one incident impressed this scene very deeply in my memory. At that time, boys wore round hats having a black cord outside wound round the bottom, with which to contract their diameter, and make them fit the head. The night of the execution was clear starlight. After dark, I issued from the house for some purpose, and, behold, between me and the sky hung the executed criminal, dangling in his black clothes. I looked twice, and there he was—there could be no mistake. I uttered a scream, and ran into the house, as if his ghost had been pursuing me. The kitchen door was open, and I flew to the light. There I saw about three inches of the black cord depending from the front of my hat having a knot on the end of it, and as this came exactly between my eyes and the sky-line, when I looked up, the appearance of the unfortunate deceased was instantly accounted for. But I passed a restless and unhappy night, and it was many days before the scene faded from my mind, so as to permit tranquillity to be enjoyed during the hours of darkness."

A curious illustration of the influence of the Imagination in modifying the perceptions of sensorial impressions derived from the outer world occurred during the conflagration at the Crystal Palace in the winter of 1866-7. When the animals were destroyed by the fire, it was supposed that the chimpanzee had succeeded in escaping from his cage. Attracted to the roof, with this expectation in full force, men saw the unhappy animal holding on to it, and writhing in agony to get astride one of the iron ribs. It need not be said that its struggles were watched by those below with breathless suspense, and, as the newspapers in-

formed us, "with sickening dread." But there was no animal whatever there, and all this feeling was thrown away upon a tattered piece of blind, so torn as to resemble, to the eye of fancy, the body, arms, and legs of an ape!

In the following case, within my own knowledge, the visual illusion was clearly excited by the idea being, in the first instance, present to the mind. A lady was walking one day from Penryn to Falmouth, and her mind being at that time, or recently, occupied by the subject of drinking fountains, thought she saw in the road a newly erected fountain, and even distinguished an inscription upon it, namely—

"If any man thirst, let him come unto me and drink."

Some time afterwards, she mentioned the fact with pleasure to the daughters of a gentleman who was supposed to have erected it. They expressed their surprise at her statement, and assured her she must be quite mistaken. Perplexed with the contradiction between the testimony of her senses and of those who would have been aware of the fact had it been true, and feeling that she could not have been deceived (for "seeing is believing"), she repaired to the spot, and found to her astonishment that no drinking fountain was in existence—only a few scattered stones, which had formed the foundation upon which the suggestion of an expectant imagination had built the superstructure. The subject having previously occupied her attention, these sufficed to form not only a definite erection, but one inscribed by an appropriate motto corresponding to the leading idea.

Dr. Wigan's well-known experience in his own person is a case in point, and is too striking to be omitted from our *collectanea psychologica*. He was attending a *soirée* given in Paris by M. Bellart, shortly after an event which strongly excited public feeling—the execution of Marshal Ney—when the incident occurred. On the arrival of a visitor, M. Maréchal *ainé*, the usher announced Maréchal Ney. Dr. Wigan says an electric shudder ran through the company, and he owns that the resemblance of the prince was, for a moment, as perfect to his eyes *as if it had been the reality*.

Mr. Braid gives the case of a lady, above fifty-six, who had, when young, been a somnambulist, but in perfect health and wide awake when the experiment was tried. Having been placed in a

dark closet, and desired to look at the poles of a powerful horse-shoe magnet, and describe what she saw, she "declared, after looking a considerable time, that she saw nothing." However, after Mr. Braid told her to look attentively, and she would see fire come out of it, *she speedily saw sparks*, and presently it seemed to her to burst forth, as she had witnessed an artificial representation of the volcano of Mount Vesuvius at some public gardens. Mr. Braid then closed down the lid of the trunk which contained the magnet, but still the same appearances were described as visible. "By putting leading questions, and asking her to describe what she saw from *another* part of the closet (where there was nothing but bare walls), she went on describing various shades of most brilliant coruscations and flame, according to the leading questions I had put for the purpose of changing the fundamental ideas. On repeating the experiments, similar results were repeatedly realized by this patient. On taking this lady into the same closet after the magnet had been removed to another part of the house, she still perceived the same visible appearances of light and flame, when there was nothing but the bare walls to produce them; and two weeks after the magnet was removed, when she went into the closet by herself, the mere association of ideas was sufficient to cause her to realize a visible representation of the same light and flame" (xxiii.). The force of this illustration would remain precisely the same if it should be proved that a light, only visible to "sensitives," does proceed from magnets.

These instances form good illustrations of the slight influence of volition over sensation compared with that of a vivid mental image or idea acting upon the sensorial centres, and distorting or moulding in other forms the impressions received from objects of sense. The fault does not lie in the afferent nerve, but in the central organs; not in the telegraph wire, but in the somewhat muddled official sitting at the company's head office and endeavoring to decipher the messages. In truth, in our ordinary language, we give the senses a worse character than they deserve. They report correctly on various occasions, but we draw an incorrect inference or read their reports in a hasty or slovenly manner. It is only when the sensory apparatus is diseased in the first instance that we can properly speak of the senses deceiving us. The common reply to this apology for our senses is that in

many instances, as in that of the oar which, although entire, looks broken in the water, our senses even in a healthy condition mislead us. A little consideration, however, will show that our senses are not really at fault even in this instance, and that if we arrive at a false conclusion, it is the result of our not making allowance for an intervening medium between the eye and the oar. Who would blame the eye because it could not have seen the oar at all, had there been a stone wall in the way? As unfair would it be to charge the eye with deception because its function is interfered with and distorted by an intervenient fluid. The child believes the oar broken because he has not yet learned the effect produced by the refracting power of water. Ignorance is the cause of an erroneous belief; the water the cause of the appearance of the oar; the organ of sight must be acquitted of all blame. Reid says he once met with a man who urged that the Protestant argument against transsubstantiation from the testimony of our senses was inconclusive, because, as there are cases in which several of our senses deceive us, how do we know that they may not all deceive us in this instance? The discussion which followed need not occupy our attention; one on the same subject between Erasmus and Sir T. More is so much to the purpose, as the influence of imagination united with belief is especially brought out, that it may be referred to, although the effect is rather a mental than a bodily one. The latter, when visited by Erasmus, endeavored to convert him to a belief in the real presence, and assured him that if he would only believe, he would be satisfied of its truth by unquestionable evidence. On leaving More's house he borrowed his pony, and finding it very useful did not incline to return it, but sent the following lines:

"Quod mihi dixisti
De corpore Christi,
Crede quod edis, et edis:
Sic tibi rescribo,
De tuo palfrido,
Crede quod habes, et habes;"

which a writer in *Macmillan* for September, 1865, translates thus:

"Remember, you told me
Believe and you'll see;
Believe 'tis a body
And a body 'twill be.

"So should you tire walking
 This hot summer-tide,
 Believe your staff 's Dobbin,
 And straightway you'll ride."

(c) AUDITORY.—As regards the sense of hearing, it is very manifest that the thought uppermost in the mind—the predominant idea or expectation—makes a real sensation from without assume a different character. If of two children listening to a peal of bells, one is told they say "Long live the King," and the other, "Never, forever," to each the chime may sound as he expects to hear it. But, of course, those instances are much more striking in which the expectation excites the central termination of the auditory nerve, so that sounds, voices, etc., are actually heard. The Imagination may be justly said to be the cause, but it is no imagination that sounds are heard. The fine passage of Madame de Stael, "So mighty sometimes is the power of Imagination, that by it we hear in our hearts the very voice and accents of one whom we love," is true in a more literal sense than probably she intended.

The influence of Attention in intensifying auditory sensations is constantly brought under our notice. The Highland woman hearing the distant pibroch when Havelock was approaching to the relief of Lucknow, is a beautiful illustration of the familiar fact that the intense direction of the thoughts to a particular sensation increases the sensitiveness of the sensorium.

Hyperæsthesia of the auditory sense is frequently observed in the so-called mesmeric state. The late distinguished ophthalmic surgeon, Mr. Critchett, states, in a letter written to Capt. James in 1845, that he was witness of this exaltation of audition in a case in which he had himself induced the hypnotic condition. So acute was the hearing that the patient "heard the least noise even in the adjoining room." Mr. Critchett adds that the patient could tell him when awake all that occurred during the apparent sleep. (*Private Letter.*)

Mr. G. H. Lewes, in an article in the *Fortnightly Review* (February, 1872), on "Charles Dickens," states an interesting fact in reference to his brain-fictions, namely (what the novelist had himself told him), that "every word said by his characters was distinctly heard by him. I was at first," he adds, "not a little puzzled to account for the fact that he could hear language so

utterly unlike the language of real feeling, and not be aware of its preposterousness; but the surprise vanished when I thought of the phenomena of hallucination." Such instances may be thought to support the opinion that the creations of the Imagination, and the images recalled by the memory, occupy the same nervous tract as those which are excited by impressions from without, and that they only require additional intensity to become, what are admitted by all to be, (subjective) sensations possessing the distinctness which ordinarily characterizes those of objective origin. At any rate, they show how great a tendency mere thought has to excite or awaken the correlated sensation. Dickens also says, in regard to his sister-in-law Mary, that after her death he was haunted by her image every day, and dreamt that he saw her every night for a year. He does not mean, we suppose, that he saw a spectral form in the day—merely a vividly defined and irrepressible memory of her person. In the dream, when the outer world was excluded, the very same image presented all the characters of a sensorial impression.

The uncertainty of determining the point from which sound proceeds, and the large extent to which we are guided by our opinion as to the direction whence it comes, are shown in a striking manner by the simple experiment of blindfolding a person, and clicking coppers in different positions. His mistakes of answering correctly as to the locality where the coppers are clicked, are frequently as great as the certainty with which he maintains, guided by some illusory indication, that he must be in the right.

Anæsthesia of the special senses in regard to all impressions from without, except those with which a person from some particular cause is in relation, is strikingly exhibited in "biological" or hypnotic states. Thus a subject may be deaf to all sounds except the voice of the operator. Sir James Simpson pointed out this fact, years ago, at a meeting of the Edinburgh Medico-Chirurgical Society. He observed that such persons "were deaf for the time to other sounds. Bells may be rung in their ears, strong noises of all kinds made, tickling, shaking, rubbing the cornea, etc., practised, but they sleep on, apparently listening alone to the voice that sent them asleep to summon them again to the waking state" (xxiv. and vii., Oct. 1851).

It may be said that in such cases it can hardly be true that the

cerebral hemispheres act upon the sensory ganglia so as to produce this effect, and that it is rather that the impressions which reach the sensorium are not perceived by the mind, unless they be directly related to the idea or ideas which are at that time dominant. Still, the state of the Intellect determines the effect of the sensorial impression. This condition is exemplified also in cases of ordinary sleep, absence of mind or abstraction, day dreaming or reverie, as well as in the somnambulistic states just referred to. Dr. Carpenter states that "Sir Edward Codrington, when a young man, was serving as signal-lieutenant under Lord Hood at the time when the French fleet was confined in Toulon harbor, and being desirous of obtaining the favorable notice of his commander, he devoted himself to his duty—that of watching for signals made by the look-out frigates—with the greatest energy and perseverance, often remaining on deck nineteen hours out of the twenty-four, with his attention constantly directed towards this one object. During the few hours which he spent in repose, his sleep was so profound that no noise of an ordinary kind, however loud, would awake him, and it used to be a favorite amusement with his comrades to try various experiments devised to test the soundness of his sleep. But if the word "signal" was even whispered in his ear, he was instantly aroused and fit for immediate duty" (viii. p. 855).

Dr. Kennedy, of London, formerly of Dublin, supplies me with a parallel instance in his own experience.

"I was taken," he writes, "by the last train from Dublin, to see an urgent case at Kingstown, and had to return on the engine. The night was wild and stormy, and a spicula of hot coal was embedded in one of my eyes. On arriving in Dublin towards early morning, I repaired at once to our most distinguished oculist, Sir William Wilde, and succeeded in getting into his house and eventually into his bedroom, anticipating getting immediate relief at his expert hands. But I had counted without my host, as I found Sir William in a most profound sleep, out of which I could by no means rouse him; shouts, shakes, and appeals were all equally unavailing. He remained obtuse, and I had given up in despair, when it occurred to me to approach him by the ruling passion, or in other words to rouse him by touching the preponderating idea that occupied his mind. I therefore placed my mouth close to his ear and in whispered accents uttered, "Wilde, there

is a foreign body in my eye, I want you to take your lancet and remove it, my eye is in agony." The effect was electrical. He sprang to his feet, took the candle from my hand, and seizing a lancet I handed him, placed me sitting on a chair, everted the lid, exposed the spicula, removed it in a trice, putting me into heaven at the same moment, completed his work, and we separated mutually pleased with each other. The process appeared to be automatic, though in a moment of waking, and sleep seemed to be instantly resumed."

(d) GUSTATORY.—So with the sense of taste. "Hold your tongue!" exclaimed a Frenchman, "I cannot taste my dinner." The conversation distracted his Attention, and would not allow him to dwell upon his viands with the gusto which a gourmand desires. With imaginative people, the food eaten or the fluid drunk assumes a very different taste according to the fancy. Misled by Expectation, the grumbler finds the meat taste bad; the water is abominable. I have known a gentleman hopelessly fanciful, send out the cream from table because it tasted sour, and find it sweet when the servant brought in what was supposed to be, but was not, a fresh supply.

(e) TACTILE (see *ÆSTHESIA*).—With persons very sensitive to tickling, the mental state of expectation aroused by the approach of another's finger towards a sensitive part of the body is, as every one knows, sufficient to cause the sensation of titillation. Nay, even the thought of it, without the gesture, may suffice to induce it. And the converse, the powerful determination to resist the sensation, is frequently found to be effectual.

The influence of belief or expectation in bewildering sensation, and rendering the subject unable to note or localize the altered conditions of pressure on the surface of the body, is important to the investigator into the alleged spiritualistic phenomena of our day. Such influence, and the extraordinary ease with which persons are misled, do not prove such allegations are all baseless, but they unquestionably prove that no one is entitled to believe them unless he has first mastered the deceptive influence of certain mental states upon bodily sensations.

On the 25th of November, 1880, Mr. Cumberland gave at the Casual Club, London, some good illustrations of the way in which the senses are thus liable to be completely mystified. From a short notice recorded by the writer in the *Journal of*

Mental Science (January, 1881), he extracts the following: "The primary object of the exhibition was to expose modern spiritualism; but its interest for the psychologist consisted mainly in the confusion induced in the sensory perceptions by certain manifestations. Thus, for example, Mr. Cumberland placed himself at a table with two gentlemen, sitting one on either side of him, with whose hands he joined his, the gas being lighted. Having satisfied themselves that both Mr. Cumberland's hands were attached to theirs, they, at his request, shut their eyes, and were asked whether they still felt his hands touching theirs. They answered affirmatively without any hesitation, whereas Mr. Cumberland had dexterously removed one of his hands and made the other do duty for both. Having obtained their full assent to this proposition, the operator, having one hand free, employed it as a 'spirit hand' to touch the heads of the gentlemen, placing also upon one a trombone. Mr. Cumberland then resumed his former connection by both hands, without the subjects of the experiment being conscious of the change, and when they opened their eyes they were clear in their opinion that whoever touched them and placed the instrument upon their heads, Mr. Cumberland did not. The illusion was complete."¹

Availing one's self of the same principle, one can easily make a person believe that a ring has been placed upon his arm while his hands remain in unbroken contact with the operator's. The surprise and bewilderment of the subject of the experiment, to which we have often been witness, are proofs of the way in which tactile sensation may be led astray by the ruling thought of the moment. The trick is thus described by Mr. Cumberland:

"A famous test introduced at dark *séances* is that of passing a ring over a sitter's arm in proof of the dematerialization theory. As the sitter is holding the medium's hand when the manifestation takes place, the spiritualists declare that either the ring in getting on to his arm must have been dematerialized or that a passage must have been made in the arm to allow of the ring passing through. . . . All that the medium has to do is, having got his hand free in the manner described, to take up the ring, passing it over his own arm, and having regained his hold

¹ These experiments are not given by me for the purpose of exposing spiritualism. Even if spiritualism were true, their force would remain precisely the same for the purpose I have in view, of exhibiting the influence of the Mind on Sensation, etc.

of the sitter's hand, ask him to grasp his hand firmly, in order, he adds, to avoid trickery, and as a natural consequence, the ring comes sliding down to the sitter's arm, who is confident that he never for one moment let go his grasp."¹

APPRECIATION OF WEIGHT.—The sense of *weight* has frequently been misled by the Imagination. The anecdote of Dr. Pearson, though well known, is so good an illustration that it can hardly be omitted in this place. When potassium was discovered by Davy, Dr. Pearson, taking up a globule, estimated its weight on his finger, and exclaimed "Bless me, how heavy it is!" simply from expecting a metal to be so, whereas the reverse was the real truth.

In his *Human Physiology* (4th edit., p. 821), Dr. Carpenter states that he "has seen a man remarkable for the poverty of his muscular development, who shrank from the least exertion in his ordinary state, lift a twenty-eight pound weight upon his little finger alone, and swing it round his head with the greatest facility." Now, this was due, first, to a mental condition rendered acutely susceptible to impressions, and then to the action of the Imagination, when the subject was assured that the weight was a mere trifle, and that he could lift it easily. This idea, by affecting the muscular sense of resistance, produced the same effect as actually lessening the weight would have done. Again, to the same individual, when in the same impressible state, a handkerchief placed on the table felt so heavy that he could not raise it after repeated attempts to do so.

In regard to other muscular sensations, they receive further illustration from the influence of the Attention on involuntary movements, in the chapters on Muscular Action.

SENSE OF EQUILIBRIUM (SEMICIRCULAR CANALS).—As an illustration of the disturbance of the senses by combined exerted attention and fear (for it is difficult to separate the two in illustrations of this disturbance), we may mention the effect produced on persons suffering from sea-sickness by having to bestir themselves on board ship and having to bale out the water in consequence of threatened danger to the vessel. The annoyance of having lost a valuable set of artificial teeth, overboard, by a gentleman laboring under sea-sickness, has been known promptly to arrest the attack.

¹ Journal of Mental Science, July, 1881.

VISCERAL SENSATIONS.—We do not propose to enter at large upon the influence of the Intellect upon the sensations of visceral origin. The general observation may be made that attention to the various processes of secretion and nutrition not only excites their activity, as will be subsequently shown, but it is accompanied by more or less well-defined feeling. The ordinary obscure sensations which these processes occasion become intensified, and a long train of hypochondriacal symptoms follows. Under this head are comprised the sensations of the alimentary canal, including the pharynx, œsophagus, stomach, and intestines. The familiar sensation at the pit of the stomach, the consequence of perturbations of mind, belongs to the Emotional section of mental states, under which also the disagreeable sensations of hypochondriasis will be referred to, although admitting of explanation by a reference to the mere operation of the Attention.

Attention directed to the stomach notably causes a sensation of weight, aggravating or even originating dyspepsia. Discomfort, a sense of tension, and other forms of sensation may, every one knows from experience, be induced in the several abdominal organs.

Probably no simpler example could be given than the following common occurrence: A child says, "thinking of that powder almost makes me sick." In fact he experiences nausea from no physical agent, but solely from the representative idea thereof in his mind. But for our familiarity with the fact, it would greatly surprise us that such should be the case.

Squeamishness is frequently caused by Attention and by other allied mental states. Marshall Hall mentions a person who could not attempt to untie a small knot without a sense of nausea.

In concluding this Section I wish to revert to states of Mind in Recollection and Imagination in connection with the vexed question of the character and seat of resuscitated mental images.

It is disputed as regards the ordinary memory of an object or the creations of the Imagination—representative consciousness—whether the same psychical or encephalic condition is excited as in the actual perception of an object present to the senses—representative states of the Mind. It is obvious that the answer to this question is of great interest in the consideration of the influence of ideal psychical states upon the body, whether intellectual or

emotional. The teachings of psychologists of the present day appear decidedly to favor an affirmative reply.

Abercrombie's work on the *Intellectual Powers* elicited a remarkable review in the *Quarterly* for July, 1831, from the pen of Sir David Brewster, who combated the idea that in Memory and Imagination the mind recalls past impressions and forms fresh combinations, "without any assistance from the organs of perception," and maintained that while in the ordinary action of these faculties, owing to the exceedingly fleeting character of the mental images produced, and the counteracting influence of the external world, we cannot fix and subject them to examination, there are exceptionally favoring circumstances which render it possible to examine them as carefully as impressions made upon the retina by luminous bodies, and that in these cases the images recalled by Memory, or created by Imagination, "follow the motions of the head and eye." This he explained by supposing that the recollection of an object previously seen, acts by retransmission from the brain along the nerves to the same points of the retina as had been acted upon by the original object, when the impression there had been transmitted to the sensorium. A very faint and transient impression was supposed by him to be formed on the retina, just sufficient for the purposes of Memory and Imagination. If, moreover, these faculties are powerful, and the nerves excitable, the retinal impression becomes so distinct as to constitute a spectral illusion. Brewster's general conclusion was this, that "in all our organs of sense, the mind possesses the power of retransmitting through the nervous filaments to the expansion of the nerves which are acted upon by external objects, impressions which these nerves have previously transmitted to the brain," feeble in ordinary Memory and Imagination, brilliant and phantasmatic in abnormal states of the brain or nerves. If for the peripheral expansion of the sensory nerves we substitute the sensorium, or whatever that portion of the brain may be in which impressions are registered, Brewster's opinion is in accordance with that to which we have just referred. His proofs are not altogether satisfactory, for, in the first place, the examples he adduces are not those of ordinary Memory or Imagination; and, secondly, as regards actual phantasms, the fact that they move with the eye may be explained on another principle than that of referring the revived impression to the external organs themselves.

At first sight, simply to think of and recall the face of an absent friend, and so to think of him as to see his face projected as if present before me, do certainly seem very distinct psychical, and therefore encephalic, conditions not only in degree or intensity, but in kind and seat. The one operation feels to be so purely "mental," the other so sensorial. That subjective sensations and objective sensations occupy the same seat cannot be doubted; but the difficult question is, whether the definite remembrance of a particular object passing beyond a mere notion, does or does not cause a true sensation, however faint. It is easy to believe that the seat of a spectral form of a mountain is identical with that of the conscious impression of the actual object when present to the senses, but not so easy to believe that in recollecting a certain mountain, and tracing its outline, or imagining one, "we are repeating the same currents and reanimating the same nervous tracks as in the survey of the actual mountain" (Bain). In opposition to this hypothesis it is urged¹ that perception is a *bi-une* fact, or a synthesis of cognition and object, while memory and imagination are not so, for the object is not present to them. It is denied that seeing a rose and the remembered outline of a rose involve the same operation of mind—the only difference being, as alleged, one of intensity. Dr. Carpenter, on the other hand, speaks of "ideas or conceptions as cerebral (*i. e.*, hemispherical) states, which seem to recall the same condition of the sensorium, as that which was originally excited by the sensory impression" (viii. p. 749). It is true, I can think of a rose, have a bare abstract notion of it, without any action of the sensorium, but it may nevertheless be true that the moment it is figured in the mind's eye, although no spectrum or phantasm is formed, there occurs a change in the optic nerve centre. Still, we think, it is practically difficult to decide at what point the strictly ideational passes into the sensational.

Let us, on account of the importance of the subject, consider a little further the changes which physiologists assume take place in recalling a sensation, such as seeing a person's countenance in the mind's eye. According to Carpenter, it is, as we have seen, a secondary change, caused by the influence of ideational (hemi-

¹ See this position ably maintained by the Rev. W. G. Davies in the *Journal of Mental Science* for April, 1864. See also the observations of Lockhart Clarke in the *Psychological Journal*, January, 1863, p. 19.

spheric) activity upon the sensory ganglia. I recall the notion of this object—the face—by which the sensory impression or state was formerly produced, and by keeping such notion before the consciousness, I am enabled to see in my mind my friend's face. The general notion is all that some can attain to, the sensational state not being reproduced. He remarks that we can remember the *expression* of a countenance better than the *features*, because the former appeals most to our ideational consciousness, while the latter obliges us to recall a sensational state. As in recollection, so probably is it in spontaneous or passive memory; though here external objects may help to excite the renewal of previous sensations. His special theory, which ought to be kept distinct from the general question, is that the sensory ganglia, in all probability, do not register sensory impressions; "these can only be reproduced afresh by the action of external objects, or ideational changes." The hemispheric ganglia, in reproducing ideas, act independently of the sensorium, except that according to this physiologist, the results of such cerebral action "must be impressed on the sensorium before we can be rendered conscious of them." Probably every sensory impression, once perceived, is registered in the cerebral optical perceptive centre, and "may be reproduced at some subsequent time, although there may be no consciousness of its existence in the mind, during the whole intermediate period" (p. 808).

It is not necessary to adopt, in an unqualified manner, the details of this somewhat elaborate theory, founded to a large extent upon the hypothesis that the hemispheres themselves are not the seat of consciousness. The essential point remains, and is as applicable to the present subject, if the hemispheres are, as we hold, conscious ganglia without the coöperation of the ganglia beneath them. We have seen that Bain (who upholds the latter view) is equally strong in maintaining that the ideas which our memory and imagination form of external objects, involve the action of the same tracts in the encephalon as are excited by impressions immediately derived from the material world, or from those internal subjective stimuli which cause actual hallucinations.

Again, Herbert Spencer, the teacher, *κατ' ἐξοχήν*, among psychologists, of the doctrine of evolution, arrives by this and other routes of profound psychical investigation at the same conclusion.

Thus, he says, when speaking of the ideas of throwing a stone, or seeing a dog run away, "these, that we call ideas, are nothing else than weak repetitions of the psychical states caused by actual impressions and motions" (x. p. 456). An expression he employs is a very forcible one—the nascent excitation of nerves in the revivability of former impressions. In the above-mentioned acts this occurs, as respects the motor apparatus, in thinking of throwing a stone; and as respects the optic nerves, in the mental picture of a dog running away. "Those vivid states of consciousness which we know as sensations, accompany direct, and therefore strong, excitations of nerve-centres; while the faint states of consciousness which we know as remembered sensations, or ideas of sensations, accompany indirect, and therefore weak, excitation of the same nerve-centres" (p. 124).

Just, then, as in perceiving objects around us, subject-consciousness and object-consciousness are united, sensorial perception passing insensibly into intellectual perception; so in recollection and imagination, the ideational and sensational changes are almost inseparable; the calling up of one of the states as originally excited by external objects, calls up the other and in this way the old paths are traversed, though in a reverse order. It must, however, be admitted that the original idea which was abstracted from the sensorial perception can arise in the mind, or be recalled as a general notion, without the action of the sensory centres being excited.

The application of this position to the influence of ideal states of mind is obvious; whether they excite by their intensity and vividness general bodily sensations, or such action of the sensorial centres that the mind refers the special sensations to objective sources of excitement; whether they cause movements, or whether they act upon the organic functions. Whatever hypothesis we adopt, the fundamental fact remains that sensation and motion are not merely more readily reproduced by the original impression being repeated, but may be reproduced without our having the slightest recourse to them, so that we may breathe an atmosphere in which the body feels, the eye sees, the ear hears, the nose smells, and the palate tastes, as acutely as if the material world excited these sensations, and may perform muscular actions without, and even against, the will, and with or without consciousness, solely in response to ideas, whether recalled by the memory or created

by the imagination—the common centre acted upon by objective impressions from without and by subjective impressions from within, being the sensorium, and the resulting sensations and motions being in many instances as powerful from the latter (the inner) source as from the former, and in some more so.

The following are the most important conclusions in connection with the Influence of the Intellect on Sensation :

1. When ideas arise from the sensorial perception of impressions upon the peripheral terminations of the various classes of nerves, they may react upon the sensory centres, and influence general, special, organic, and muscular sensations, causing sensational illusions.

2. When, through intellectual operations, ideas are imagined or recalled, these may be merely ideational states, but they ever tend to become identical in character though not necessarily in degree, with the complex states formed when peripheral impressions from external objects first excited them. The recurrence therefore of the ideational states, coöperating with the sensory centres, usually recalls also, although but faintly, the sensation corresponding to the idea.

3. In some conditions of the brain, the sensory centres may be so powerfully excited, that the effect is identical in sensory force—in objectivity—with that which results from an impression produced upon the peripheral terminations of the nerves, causing hallucinations or phantasmata.

4. The mind under certain circumstances can, by Attention, recall the sensorial impression so distinctly as to produce, *e. g.*, in the case of sight, the spectrum or image which was impressed on the retina and perceived by the sensorium.

5. Not only may hyperæsthesia of one or more of the senses be produced, but complete anæsthesia be caused by the actions of the Intellect.

CHAPTER III.

INFLUENCE OF THE INTELLECT UPON THE VOLUNTARY MUSCLES.

THE several mental states comprised under the Intellect may, by their action on the voluntary muscles, induce—

- I. Coördinate contraction and relaxation: Movements.
- II. Irregular and excessive contraction: Spasms and convulsions.
- III. Loss of power: Paralysis.

Section I.—Muscular Contraction and Relaxation: Movements.

The influence of an intense and exciting idea or thought in inducing well-marked movements, is admirably illustrated in the description of two characters—one real, the other, indeed, fictitious, but sketched by the hand of a master, equally true to nature.

Sir Philip Francis is described by his biographer as “pacing rapidly forward *as if to pursue a thought*. He would then suddenly turn short round, draw himself up to his full height, and ‘with a sweeping of the arm’ evolve some epigrammatic sentence or well-rounded quotation. Even his own family, habituated as they were to these sudden interruptions of the measured tread with which he loved to pace up and down the utmost length that a small suite of rooms would allow him, were sometimes startled by the vehemence of the outbreak, and strangers were absolutely electrified” (xiii., i. p. 454).

The other character,¹ fictitious, is thus graphically described: “His small, nervous body was jarred from head to foot *by the concussion of an argument* to which he saw no answer. In fact, the only moments when he could be said to be really conscious of his

¹ Rev. Rufus Lyon in his conversation with Mrs. Holt. George Eliot's Works, Felix Holt, p. 47, popular edition.

body were when he trembled under the pressure of some agitating thought." To some extent, no doubt, in both these instances, the intellectual element was followed by emotional excitement which intensified the character of the external commotion.

Observe the eye when thought is concentrated upon a subject of purely intellectual interest. It illustrates a law we shall speak of more fully when we have to treat of the Emotions—the parallelism between the outward signs of mental states and the action of the senses.¹ Why, as regards any practical good to be attained, should any change occur in the organ designed only to examine external objects? Yet, as if stepping out of its province, it frequently peeps and pries, and strains all its powers to gain an insight into what is hopelessly beyond its ken. Why, but because the movements excited by the objects of the outer world, acting upon the senses, take place not only then, but when the thoughts are occupied by ideas having no relation whatever to the external world. It may seem a contradiction to this statement that, in profound meditation, the eyelids are sometimes closed to exclude outside distractions—the impressions from without calculated to confuse those from within—but the exception is only apparent, for the eye, when thus veiled, continues to fix its gaze steadily upon imaginary objects, or in motion endeavors to track an idea through intricate mazes of thought. The appearance of the eyes in ecstasy is a striking example of the appropriate, but, so to speak, purposeless, action of the muscles of the eyeball in ideal states of mind. Again, the axes of the eyes in an absent man walking through the street are not fixed upon the objects which he meets, but are directed towards a point suggested by a subjective image. Hence, confused vision and the danger of running against anything in the road. The philosopher is described by Engel as walking, while pursuing some luminous train of thought, with his eye ardently fixed, the eyelids sometimes joyously opened, sometimes half closed, engaged in imaginary contemplation. Figurative language corresponds to figurative gestures. We speak of the "mind's eye" and "mental insight." When we perceive

¹ Figurative or metaphoric expressions derived from Sensation are introduced here, instead of in the chapter on Sensation, in order to illustrate the parallelism between the action of the muscles when excited by Sensation and by Emotion. Diderot pointed out the importance of this correspondence, but we are mainly indebted to Gratiolet for having worked out the idea in detail.

the bearings of a question, we say emphatically "we see it." "The eyes of your understanding being enlightened" is another familiar example, and we must add—

"Who so gross
As cannot see this palpable device?
Yet who so bold but says he sees it not,
When such ill-dealings must be *seen in thought*?"

The French say "Je goûte cela," a mode of speech characterized by Gratiolet, as "éminemment heureuse et fine," and he ends a lecture by expressing a hope that his propositions have been "goûtées" by the intelligence of his hearers.

The behavior of the gustatory muscles and the salivary glands is in strict accord with this, when engaged in an *intellectual repast*, "the feast of reason and the flow of soul." Such expressions are sufficiently significant of the fact that figurative movements accompany certain operations of the Intellect, namely, smacking the lips, swallowing, etc. The description of Captain Porter at the Marshalsea, in Dickens's reminiscences of his early life, is most characteristic of this principle. He read aloud a certain petition, prepared to present to the king, praying for a bounty to the prisoners to drink his Majesty's health, on the occasion of his birthday, to all who would hear it when attaching their signatures. "Captain Porter, in a loud, sonorous voice, gave him every word of it. I remember a *certain luscious roll* he gave to such words as 'Majesty—gracious Majesty—your gracious Majesty's unfortunate subjects—your Majesty's well-known munificence,' *as if the words were something real in his mouth, and delicious to taste*" (Forster's *Life*, vol. i.).

"J'entends cela" means either I hear or understand that—a double signification, due to the same remarkable parallelism existing between the two series of facts; and although here the muscular correspondence is not at once so clear as in the case of sight, the expression of the facial muscles, when a subject is not understood, strikingly resembles the painful distraction of deafness.

We will only add, by way of illustration of all the senses being figuratively used, the forcible language of Sir Philip Francis, on receiving from Edmund Burke a proof-sheet of his reflections on the French Revolution—language worthy of "Junius:" "The

mischief you are going to do yourself is, to my apprehension, palpable. It is visible. It is audible. I snuff it in the wind. I taste it already. I feel it in every sense, and so will you hereafter" (xiii., ii. p. 282). A really magnificent example of figurative expressions!

The influence of expectation (or expectant attention) upon the facial muscles, is well exemplified in the appearance they assume when a gun is about to be fired. The person so affected does not expect that anything is going to happen to himself, but there is a certain involuntary nervous twitching, which anticipates the instinctive contraction of the muscles around the eye, occurring when a sudden explosion or shot actually requires the protection of the eye from danger.

The effect of thought upon the facial expression, universally admitted as it is, has hardly been recognized till recently in definitely indicating in a most unintentional but frequently precise manner, the idea at the moment present to the mind. It is by this means that a "medium" or a "thought-reader" can often tell a person his name or the word he is thinking of, by inducing him to point to the letters of the alphabet in succession. The slight, yet sufficient movement in a facial or other muscle on touching the right letter, all unconscious as it is, suffices to prove a tell-tale, and it is certainly astonishing when first witnessed. Mr. Cumberland has repeatedly shown how difficult it is for some people under expectant attention to control their muscles so as to offer no clue as to what is going on in their minds. "With such people, keen-sighted mediums, with their natural perceptive faculties sharpened by practice, have an easy task; but with less impressionable persons a greater difficulty is experienced, whilst nothing but failure results from those possessing a stoical temperament" (xxi., January, 1882).

We see a different form of expectation exhibited in the common experiment of discovering the time of day, by holding a coin or ring by a hair or silk thread suspended between the finger and thumb in a glass, against the sides of which it is expected to beat the time of day. As is well-known, it often proves successful, the unconscious action of the digital muscles responding to the idea or expectation present in the mind of the person making the trial. I was not aware that this, with a slightly different object, had been an old experiment, until looking recently into Lord

Bacon's works I found the following: "It is good to consider upon what things imagination hath most force; and the rule, as I conceive, is that it hath most force upon things that have the lightest and easiest motions. . . . Whatsoever of this kind should be thoroughly inquired into. . . . There would be trial made of holding a ring by a thread in a glass, and telling him that holdeth it, before, that it shall strike so many times against the side of the glass and no more." He adds an experiment depending for its success on the same principle, that of "holding a key between two men's fingers, without a charm, telling those that hold it that at such a name it shall go off their fingers." Bacon concludes thus: "Howsoever, I have no opinion of these things, yet so much I conceive to be true; that strong imagination hath more force upon things living, or that have been living, than things merely inanimate; and more force, likewise, upon light and subtile motions than vehement or ponderous" (xiv. *Nat. Hist.*, 957).

From the time of Bacon to that of Chevreul no one, so far as I know, investigated the subject in a philosophical spirit. The latter, finding that a pendulum composed of a flexible wire and heavy weight, would oscillate when held by the hand over certain bodies (*e. g.*, mercury), although the hand was fixed and motionless, placed a sheet of glass between the mercury and pendulum when in motion, and found its oscillations uniformly impeded and at last arrested. Feeling that he had not discovered in the quicksilver the real cause of the motion of the pendulum, he fixed the hand from which it was suspended, instead of merely the arm. The result was that the pendulum did not move at all, whether, or not, the glass intervened between it and the mercury. He justly concluded that an unconscious muscular movement explained the oscillations which had puzzled him, and he had a vague remembrance of being in "*un état tout particulier*" (xv. p. 280) when his eyes followed them. He next took the precaution to have his eyes bandaged, and found that this also had the effect of preventing any action of the pendulum.

His careful investigations resulted, therefore, in the conviction that, although a pendulum suspended from the hand over certain bodies moves and performs oscillations which increase more and more in extent, this motion is diminished and at last arrested, if glass, or anything else, be interposed between the pendulum and

the body over which it oscillates, with the *expectation* that it will have this effect. Further, it is arrested the moment the hand itself is supported, or if the eyes of the experimenter are bandaged; the reason of the latter being that the guiding sense of sight, so essential to motion when the will is in abeyance (as exhibited in paralysis), has been taken away.

Nothing can more clearly illustrate than the above experiment, the influence of what is popularly called the imagination, and which resolves itself in such cases into expectation. It forms an *experimentum crucis* which demonstrates the true principle at work in a large number of the cases given in this book; a principle which, when called by its right name, is by no means to be despised. For the pendulum substitute a limb contracted from functional disorder, and the application of the same law becomes practically useful. The operation of the imagination is reduced to simple imagining, and can be intensified by other psychical forces.

One more exceedingly simple illustration may be adduced of the influence of what may be called expectant imagination upon muscular action; and that is, the act of *falling*, from expecting to fall, as happens to a man walking on a narrow, but sufficiently broad path on the top of a house or mountain. In Bacon's *Natural History*, this very example is given under "Experiment solitary, touching the force of imagination, imitating that of sense." The *rationale* being thus worded, "for, imagining a fall, it putteth his spirit into the very action of a fall."

The involuntary and unconscious movements performed when the hands rest on a table with the expectation of it moving, and its consequent tipping, are notorious instances of the influence of mind on the voluntary muscles. Mr. Cumberland attended a *séance* where all present were "perfectly honest though self-deluded." As no manifestations took place, the question was asked whether there was any sceptical influence at work which prevented "the spirits" manifesting, and the table tipped "*Yes*" (three tips). In reply to the inquiry whether there would be any manifestations, the table tipped "*No*." Mr. Cumberland remarked "there will be no manifestations," and held his thumb under the rim of the table. "I saw the sitters exchange glances, and once more the table began to waver; finally, under the predominating influence of those who were in favor of the 'spirits'

manifesting, it tipped out an answer negating the first. With my thumbs thus placed, I distinctly felt the sitters opposite to me push the table, causing it to tilt." Yet it appears that for years these well-meaning people had been sitting at the table, unconsciously causing it to answer their questions, firmly and honestly convinced that the tilts were due to supernatural agency (xxi., January, 1882).

Professor Barrett, of Dublin, has contrived a very simple apparatus, by which the pressure of the fingers on a board on wheels moves the indicator on a dial containing the letters of the alphabet. If the experimenter expects a certain word—say his name—to be spelt out on the dial, he will as a rule, should his eye rest upon the indicator, so unconsciously influence it by pressing on the board that the letters will be correctly indicated.

Since the first edition of this work appeared, attention has been forcibly directed to the subject of *thought-reading*, principally through the public performances of Mr. Bishop and Mr. Cumberland who have succeeded in many instances in divining the thought present in the mind of a person at the time.

Granting, for the sake of argument, that one man has ever possessed the power of becoming actually cognizant of the thoughts of another directly and not through any of the senses, such alleged power of clairvoyance has nothing whatever to do with the object of this treatise, for it affords no illustration of the influence of the mind upon the body. It belongs to an entirely different class or order of phenomena and ought to be carefully kept distinct.

On the other hand, the fact that such thought-reading is performed through the indications afforded to the observer by the influence exerted by the thought present in the mind, upon the features, or other parts of the body of the subject of the experiment, affords a very striking example of the influence which in this work forms the subject of inquiry.

Having had various opportunities of carefully observing the attempts made by both Mr. Bishop and Mr. Cumberland, the author has no hesitation in referring their success, so far as they are successful, under test conditions, to the operation of those laws governing the action of Mind on Body which are discussed in these pages.

Few persons without the proof afforded by such experiments

could be prepared to expect that their thoughts are so rapidly transmitted, and, as a rule, so accurately registered, upon the muscular and vascular system; yet such is undoubtedly the truth, and being true, the power of reading the thoughts must altogether depend upon the observation, acuteness, and experience of the observer. That by these qualifications great, and what at first sight appears marvellous, success can be attained, has been now abundantly proved. A man conceals unknown to the thought-reader an article in any place he chooses; the latter enters the room blindfolded or not, and takes hold of the hand of the subject, and, it may be, presses it to his forehead. He then walks rapidly with him through the room, throwing all his mind into the pursuit, and concentrating his attention upon the faintest indication of the subject's thoughts—the latter, wholly unconscious that he is all the time speaking, not indeed through his voice, but by his muscles, tightens or relaxes the grasp of the thought-reader's hand or presses more or less forcibly upon his forehead, according as he approaches or recedes from the hidden article. More than this, the vaso-motor system is affected by the excited attention or expectation of the subject, the pulse quickens and the hand perspires on approaching the object of search. That the indications afforded by the involuntary contraction of the voluntary muscles and the state of the circulation and sweat glands, are often supplemented by the tact and pardonable guesses of the thought-reader as to where the object is likely to be secreted, the author does not doubt; but that there is a sufficient amount of actual muscle-reading to make the experiments of scientific interest and fairly applicable to our present purpose, he has little doubts. When not blindfolded, or imperfectly so, a thought-reader is further assisted by the unconscious facial expression of the subject, as he nears the concealed article.

Mr. Alfred O. Capper who has proved himself, to my knowledge, very successful as a thought-reader, writes to me as follows: "I consider the term 'thought-reading' a wrong one, as I never receive any actual transmission of thought. In my opinion, the subject does very often quite involuntarily and unconsciously lead me to the spot, though I have succeeded with several gentlemen who have purposely tried to prevent me accomplishing the object as far as the pressure of the hand is concerned.

"I am always blindfolded, and generally feel an impulse to rush

to a certain place, and I go to the exact spot, although it may be a short time before I find the article that may be hidden. Of course I cannot succeed with every 'subject,' but I generally am successful.

"As I said before, the 'subject' does very often help you, although he will declare he did *not* do so. But how it is one sometimes succeeds with others who do not give you any muscular indication, I am really unable to say. So-called thought-reading is a most interesting study." (Jan. 29, 1883.)

The influence of Sympathy or Imitation on the body has been referred to when speaking of the signification to be attached to these terms. Southey has recorded in *The Doctor* a remarkable instance of Imitation, in which the automatic action of the brain is strikingly exhibited:

"I remember," says a certain Mr. George Garden, in a letter written from Aberdeen in 1676, "when Mrs. Scorr gall and I were with you last summer, we had occasion to speak of a man in this country very remarkable for something peculiar in his temper, that inclines him to imitate unawares all the gestures and motions of those with whom he converses. We then had never seen him ourselves. Since our return we were together at Strathbogie, where he dwells, and, notwithstanding all we had heard of him before, were somewhat surprised with the oddness of this dotterel quality. This person, named Donald Munro, being a little, old, and very plain man, of a thin, slender body, has been subject to this infirmity, as he told us, from his infancy. He is very loath to have it observed, and therefore casts down his eyes when he walks in the streets, and turns them aside when he is in company. We had made several trials before he perceived our design, and afterwards had much ado to make him stay. We caressed him as much as we could, and had then the opportunity to observe that he imitated, not only the scratching of the head, but also the wringing of the hands, wiping of the nose, stretching forth of the arms, etc.; and we needed not strain compliments to persuade him to be covered, for he still put off and on, as he saw us do, and all this with so much exactness, and yet with such a natural and unaffected air, that we could not so much as suspect that he did it on design. When we held both his hands and caused another to make such motions, he pressed to get free; but when we would have known more particularly how he found

himself affected, he could only give us this simple answer—that it vexed his heart and brain.”

The Sympathy of the whole frame with the prominent ideas of the mind, by which one muscle or organ, when aroused to action by mental states, excites other muscles or organs, should not be overlooked. The term so applied has the authority of John Hunter, who lays down the law that “every part of the body sympathizes with the mind, for whatever affects the mind, the body is affected in proportion” (ii., iv. p. 167). This homogeneity between the actions of the muscles is exhibited whenever one muscle is excited by mental activity. When ideal, it follows the course which would have been pursued in reality. As in presence of an actual scene, so in Imagination, when a person vividly imagines another in danger—say from the fall of a heavy weight—how the entire attitude assumes the form of averting the impending danger! Reason tells him it is altogether useless to move a single muscle, yet not only does the law of Sympathy impel him to gesticulate, but forces the whole system into harmonious action—the eye, the facial muscles, the arms, and the legs, are thrown into violent action. When the scene is purely the work of Imagination, the effect is ordinarily feeble in character; but when a real scene is witnessed at too great a distance to render assistance, while the horror depicted in the countenance is merely the facial expression of the Emotion, the motions of the arms, trunk, and legs are the automatic representations of the forms they would actually assume if rendering help on the spot. Thus, from the wonderful fellow-feeling established by nature between mind and mind, body and body, or between the various parts of the mental and bodily constitution of an individual, the Imagination, “sending electrical thrills through every nerve of the body,” stirs, through the operation of Sympathy, the whole being to its depths; the nearest stations being in communication with the most distant outposts, and the frame changing now with its own and now with another’s condition, as reflected in its own chambers of imagery.

The influence of Attention, pure and simple, upon the voluntary muscles (usually muscular sensations) is not so striking as that of some of the foregoing mental states. Directed to the pharynx, it usually occasions deglutition. If we are engaged in swallowing food, it does not assist the regular action of the muscles, but dis-

turbs it; the impression made by the presence of a morsel in the gullet, and that derived from the Attention, not being necessarily consentaneous. Attention or the direction of Thought to a part, does not affect the muscles under the control of the Will so easily as those which are not; and it is the semi-voluntary character of the pharyngeal muscles which renders them, among the striped muscles, the most susceptible to its influence. The muscles engaged in articulation are also markedly influenced by Attention, though not so much so as by Emotion. In the pronunciation of words, the embarrassment caused by too prolonged an Attention to the emphasis and the aspirates, is familiar to all; and the only remedy then is to pronounce them with as little thought as possible as to their correct enunciation. Thus a schoolboy becomes frequently thoroughly "potted" by the teacher's method of tuition ignoring the operation of this principle, and the more he is ordered to attend carefully to minute shades of difference in his mode of reading or speaking, the more difficult does it become. In stammering, the influence of Attention is well known, apart from those occasions in which it is mixed up with emotional excitement.

Other examples might be given, but these, with the illustrations already brought forward under Expectant Attention, are proofs of the influence of the Attention, directed in a definite manner. In truth, as regards the voluntary muscles, it almost requires the guiding influence of an expectant idea to induce any well-marked action. Simple attention to the finger or the foot seems, however, to render it more difficult to keep it motionless. A certain fidgetiness is begotten in the muscles of the part. These irregular muscular contractions occurring as a result of this cerebral state appear to be indicative of an overflow of energy from those centres which are connected with the higher intellectual processes, more especially with attention to either the motor portion of the cortex or the basal ganglia. The latter seems the more probable, if we accept the current ideas concerning the analogous case of the movements in that morbid condition known as post-hemiplegic chorea or athetosis.

Whether the movements occurring from attention are purely automatic or partially voluntary, the hemispheres appear to act upon the sensori-motor ganglia, and the influence is transmitted, in either case, through the medium of the same cerebro-spinal

nerves as convey the mandates of the Will. In directing the Attention to a special point of the body, an idea may act directly upon the motor ganglia and nerves (ideo-motor action), or it may set up action in one or more of the sense-centres (ideo-sensory action), and so secondarily lead to movements.

Section II.—Irregular and Excessive Muscular Contraction: Spasms and Convulsions.

Few are the illustrations which will be given of the influence of the Intellect in causing spasms and convulsions. When we treat of the Emotions, our cases will be abundant, and the difficulty will then be in selection rather than collection. A cold and abstract idea, before it generates an Emotion, is not calculated to cause excessive muscular contractions.

Mental application, even of a very slight character, may cause a fit of epilepsy. Marshall Hall observes—"Dr. Tyler Smith has related to me an instance of an epileptic girl who experienced an attack whenever she tried to undo a difficult knot in her work, which was tapestry" (xvii. p. 24). Galen mentions a young man, a grammarian, who had epileptic fits whenever he studied hard.

It is, however, when a powerful expectation is excited that we are most likely to witness spasm or convulsion. To obtain cases in which Expectation of the phenomenon only exists, without the emotion of Fear, is, however, a difficult task.

We conclude from the statement of the French Commissioners on Animal Magnetism—"upon persons endowed with sensitive nerves we have produced convulsions, and what are called crises"—that the effect was brought about by leading the subjects to expect a certain result. They add—"Animal Magnetism alone, employed for thirty minutes, has produced no effect, and immediately the Imagination has produced upon the same person, with the same means, under circumstances absolutely similar, a very severe and well-characterized convulsion."

The confident assertion, that a person subject to epileptic fits will have an attack, has frequently proved sufficient to produce one. Madame de St. Amour attained great reputation in France, within the last half century, for the power she exercised over

nervous diseases. It is related that on one occasion a young woman was brought to her, when she demanded—"What is your complaint?" "Epilepsy," replied the girl. "Then, in the name of the Lord, have a fit now!" exclaimed Madame de St. Amour. The effect was instantaneous. The patient fell backwards, and had a violent attack of epileptic convulsions. Without Expectation, the simple thought or remembrance of previous attacks suffices with some epileptics to cause a recurrence of the fit; and still more potent is the recollection of the cause, if the cause has been of an alarming character. Ideal Emotion simply takes the place of the original feeling. In Van Swieten's works is recorded a case of epilepsy which may be referred to this principle, that of a boy who, having been frightened into epileptic fits by a great dog, had a recurrence of the attacks whenever he heard a dog bark.

The mischievous influence of Sympathy or Imitation is exemplified in the following case, which occurred at Lyons. The *Journal des Connaissances Médico-Chirurgicales* (16th February, 1851) treats such occurrences as "excessively rare in the annals of physiology." They certainly are not frequently reported, but occur more frequently than would be supposed from this circumstance. In a workshop where sixty women were at work, one of them, after a violent altercation with her husband, had a nervous attack. Her companions pressed round her to assist, but no sooner had they done so than first one and then another fell a prey to the same kind of attack, until twenty were prostrated by it. The contagion appeared likely to spread through the company, but was checked by clearing the room. The reporter in the above journal, in adding that there are few precedents, remarks that history, in fact, scarcely presents more than two, the famous scenes in the Cemetery of St. Médard, and the occurrence in Boërhaave's practice, which is so well known. Illustrations of the pernicious influence of this principle in connection with witnessing or reading the reports of atrocious crimes, as in the *Police News*, will occur to the reader, and need not be detailed here, as they do not constitute such good examples of bodily effects from Sympathy as those just referred to, though striking evidences of a blind instinct depending for its beneficial operation upon the control of reason and the moral sense, but, lacking these, leading simply to a mischievous reproduction of acts, the

images of which are impressed on the mind through one or other of the senses. From what but the unreasoning operation of this law, excited by an association of ideas, could it happen that, when a sentinel of Napoleon's army committed suicide by hanging himself in his sentry-box, several immediately followed his example when they became his successors in the same box? What a practical commentary on this imitative principle of the mental constitution that, to prevent further mischief, Napoleon found it necessary entirely to destroy the box by fire. Such facts demonstrate in strong colors the duty of not neglecting the idiosyncrasies of men and women as regards the association of external forms and internal images. Often what we call idiosyncrasies are the workings of a universal principle acting exceptionally in consequence of the absence of certain modifying influences—a principle underlying a thousand acts, unsuspected or unrecognized until exposed by the removal of its ordinary safeguards.

Cases of spasmodic action of the pharynx, more or less assuming the form of hydrophobia, and of mental origin, are more likely to arise from a powerful Emotion than an intellectual act, and will be given under that head. One case, however, may properly be given here. Dr. Ferriar, in his *Medical Histories and Reflections* (vol. iii. p. 46), treating of *Rabies Canina*, observes:

“Dr. Percival has justly remarked in his letter to Dr. Haygarth that the difficulty of swallowing is sometimes produced by the power of Imagination alone. I met with an instance of this kind lately in which it was very difficult to prevent a person from rendering himself completely hydrophobic. Himself and his wife had been bitten by a dog which they supposed to be mad. The woman thought herself well, but the man, a meagre, hypochondriacal subject, fancied that he had uneasiness in his throat, and that he could hardly swallow anything. When he first applied to me, a medical friend who was present asked him whether he had any sensation of heat at the pit of the stomach. He answered in the negative doubtfully; but next day I found him in bed, complaining of heat at the pit of the stomach, difficulty of swallowing, tremors, and confusion in the head. He continued to persuade himself he was ill of rabies, and confined himself to bed, expecting death for nearly a fortnight. At last I remarked to him that persons who were attacked by rabies never survived more than

six days; this drew him out of bed, and he began to walk about. By a little indulgence of his fears this might have been converted into a *very clear case of hydrophobia*, and the patient would probably have died."

It is important to remark that, as pointed out by many medical writers, but by no one so forcibly as by Rush, the mere *mention* of water will, in a hydrophobic person, induce the recurrence of the symptoms. The image—the Imagination—causes the same effect as the attempt to swallow water. Since consciousness may or may not be present, it may seem to be a misnomer to speak of the influence of the mind at all upon the body. But at any rate, in reference to the cases which are now under consideration, the condition of consciousness is implied, for it is by reaching the hydrophobic patient's consciousness, by mentioning to him water, by the induction of a definite idea in his mind, that the first change in the series of phenomena is excited. That ideaginous changes (paradoxical as the statement is) may take place without an idea is, no doubt, true when properly understood. It sometimes happens that the term "consciousness" is employed in different senses, and confusion is occasioned. Thus, there may be a state of the hemispherical and sensory ganglia, as in somnambulism, in which there is apparently unconscious sleep, but the centres respond to an idea introduced into the mind, and one says that the individual is conscious of this particular impression. But in the ordinary sense of consciousness this may not be true. The fact is, one person assumes that to have an idea is to be conscious; and another, that an idea may be present as an excito-motor, without the mind being conscious. The terms consciousness and impressibility are frequently confounded together. That the brain may act in a reflex or automatic manner, without consciousness as it is ordinarily understood is indisputable; but that the brain, in regard to that which is conveyed to it from without, must be impressible, is equally clear. If a man's cerebral hemispheres are so thoroughly asleep that no impression can reach them, it is clear that no idea, understood as a state of conscious mind, can be excited; the sensorial ganglia can alone respond to impressions made through the senses. That, however, the hemispheres may be in a state in which they respond to impressions conveyed to them from without, or that a latent idea (so-called) may excite movements, without the person being conscious in the popular

sense of the term, is that which can and does happen. If a man, who is hydrophobic, has an apoplectic fit, and consciousness is abolished, the spinal cord may act, the sensory ganglia may act, but no "mention of water" will excite the characteristic spasm. Restore consciousness, and the mention of water has its effect. In this and similar cases consciousness is merely a condition. In the epileptic woman, Madame St. Amour's command that she should have a fit would have had no effect without consciousness.

Under this section fall those cases of cataleptic rigidity which occur in certain susceptible states of mind from the influence of Expectation. In the following illustration the effect of what is usually called Imagination, which is here synonymous with Expectation or Expectant Attention, is admirably exemplified apart from the particular muscular affection which resulted. "I had heard much," says Mr. Braid (xx. p. 82), "of an interesting case of a highly susceptible lady, so susceptible to ordinary mesmeric passes that she might be sent off into the sleep by the most simple attempt to produce it, and so sensitive of the influence of magnets that she was quite uncomfortable if a magnet were near her in any room, and in the dark she could point out any part of the room where a magnet of very moderate power was placed, from her seeing the light it produced streaming all around it. I was kindly invited to spend an evening at this lady's house to afford me an opportunity of seeing and hearing more particulars of these wonders. I had the pleasure of sitting very near the lady, and of enjoying a long and interesting conversation with her and her husband, and no manifestation whatever took place during the whole time until after I had explained my views regarding the power of an act of *fixed attention*, directed to any part, in modifying the natural condition of the part so regarded. She was requested to direct her fixed attention to her hand, and watch the result, without anything being done either by her husband or any one else. She did so, and very quickly fell asleep, *and the arm to which she had directed her attention became rigidly cataleptic.*" Mr. Braid, it must be added, had a fourteen-pound lifting magnet, with the armature unattached, in his side pocket next to the lady.

Section III.—Loss of Muscular Power: Paralysis.

The simple belief or conviction that a muscle cannot be contracted or relaxed is sufficient in a sensitive person, or in one in whom this sensitiveness is induced, to cause temporary loss of power. It is referred to the Imagination; in other words, the effort to carry out the desire or will is paralyzed by the absorbing conviction that it will be ineffectual.

Dr. Gregory gives the case (a very common one) of Mr. W—, an officer, “biologized by Dr. Darling, whose muscular motions were controlled in every possible way. He was rendered unable to raise his hands or let them fall; he was made unable to move one while he could move the other; unable to sit down or to rise up; or to take hold of or let go an object” (xix. p. 353).

In the following curious case, the influence of expectation, the conviction of inability to use the muscles engaged in articulation, is well exhibited:

“In Kleische, a small village in Germany, belonging to Mr. V. S—, a maid servant of that gentleman’s family was sent a short league from home to buy some meat. She executed her orders correctly, and as she was returning in the evening, she thought she suddenly heard a great noise behind her, like the noise of many wagons. Upon turning round she observed a little gray man, not bigger than a child, who commanded her to go along with him. She did not, however, return any answer, but continued to walk on. The little figure accompanied her, and frequently urged her to go along with him. Upon reaching the outer court of her master’s residence, she was met by the coachman, who asked her where she had been, to which she returned a very distinct answer. He did not remark the little man, but she still continued to do so. As she was passing the bridge, he summoned her for the last time, and upon her refusing to answer him, he told her with a menacing look, that she should be four days *blind and dumb*, and having said so he disappeared. The girl hastened to her apartment, and threw herself on the bed, *unable to open her eyes, or to pronounce a word*. She appeared to understand all that was said, but could not make any answer to the questions which were proposed to her, except by signs. Everything was tried for her recovery by the family with whom she lived, but all was in

vain. She was incapable of swallowing the medicines which were ordered for her. At last, *on the expiration of the fourth day*, she arose in tolerably good health, and narrated what had happened to her" (lxiii., ii. p. 15).

Professor Bennett records, on Professor Christison's authority, two cases which appear to be illustrative of the influence of a mental state unconnected with emotion or with organic disease upon the power of locomotion. "The first was that of a gentleman who frequently could not carry out what he willed to perform. Often on endeavoring to undress he was two hours before he could get off his coat, all his mental faculties, volition excepted, being perfect. On one occasion, having ordered a glass of water, it was presented to him on a tray, but he could not take it, though anxious to do so, and he kept the servant standing before him for half an hour, when the obstruction was overcome. In the other case the peculiarity was limited. If, when walking in the street, this individual came to a gap in the line of houses, his will suddenly became inoperative, and he could not proceed. An unbuilt-on space in the street was sure to stop him. Crossing a street also was very difficult, and on going in or out of a door he was always arrested for some minutes. Both these gentlemen graphically described their feelings to be 'as if another person had taken possession of their Will'" (xviii. p. 16).

Demangeon (lx.) cites from De la Roque's *Journal de Médecine* the following case: A woman saw a man with a paralyzed arm without any ill-effects; but, subsequently, on recalling the circumstance, her arm felt numb. On attempting to take up a bottle of brandy she was unable to grasp it, and let it fall. One side of the body became paralyzed. Alarmed, and afraid of losing all power, she soon experienced a general loss of feeling and motion. An emetic was administered, and she was bled. On recovering from the seizure she explained, as above, the circumstances preceding the attack. We are not informed whether the symptoms entirely passed away or not. It is much more likely to have been simply a case of hysterical paralysis, than an oncoming attack of real paralysis hastened by the mind dwelling upon the man's palsy.

Hysterical affections of the joints are good examples of morbid conditions arising from the imagination, but are usually more or less emotional states. Sir B. Brodie observes, "the symptoms

may frequently be traced to the circumstances of the patient's attention having been anxiously directed to a particular joint."

Sir James Paget, in his *Clinical Lectures and Essays*, commenting on Brodie's statement that at least four-fifths of the female patients among the higher classes of society, supposed to labor under diseased joints, only labor under hysteria, observes that among his hospital patients, in and out, the proportion of nervous joints has been less than one-fifth. He finds the hip and the knee, which are the most frequent seats of real disease, to be equally so in the mimicked cases; next in order, but rarely, the tarsal and carpal joints, or the elbow and shoulder (xlix. p. 204).

Actual paralysis from hard and prolonged intellectual labor should here be noted as a not impossible result. In many of the cases which come under our notice, there are other causes at work, such as anxiety, disappointed ambition as to literary fame, impecuniosity, etc., and no doubt it would be difficult to find a case of purely intellectual paralysis. At the same time excessive exercise of the reasoning powers must be accompanied by danger. It would be interesting to have some estimate of the number of literary men who succumb to paralytic affections, although, for the reason above stated, open to considerable fallacy. It may be remarked that these cases of paralysis do not, as a general rule, come on suddenly, but, as Dr. Richardson truly remarks, are preceded by significant warnings, the most striking being "a sensation on the part of the patient of necessity during any mental effort for frequent rest and sleep; symptoms such as are described so faithfully by Johnson as belonging to the case of the poet Cowley. The cause of these cases is usually clear; it is a progressive course towards general palsy of mind and body, and it is not unlike the decline of mental activity in the age of second childishness and mere oblivion. When this condition exists, at however early a stage, the slightest shock tells on the nervous structures, and transforms suddenly the threatening malady into the extreme reality. Sudden muscular paralysis is the most common sequence of shock under this condition; it is in most cases at first a local paralysis, but it may at once be general in respect to all the muscular system under the control of the centres of volition" (*On Physical Disease from Mental Strain*, xxi., 1869, p. 260).

Gall records the case of a man who had been partially cured of

a wound in the brain, and in whom, if the exertion of mind was prolonged, "the whole of one side was paralyzed" (xxii., ii. p. 115).

In Sir James Paget's chapter on "Nervous Mimicry," or Neuro-mimesis, from which the foregoing reference to hysterical joints was cited, he records a case of functional paraplegia as a very striking illustration of the effect of mental strain. "I saw one day," he says, "a young gentleman who had been overworking for a Civil Service examination. After a three hours mathematical cram he fainted, and when he rallied, had a very close mimicry of paraplegia, which lasted many weeks" (xlix. p. 200).

The following observation made by this surgeon is entirely in accord with the fact that a great man like Hunter could easily induce psycho-physical phenomena in his own person: "Nothing can be more mischievous than a belief that mimicry of organic disease is to be found only or chiefly in the silly, selfish girls among whom it is commonly supposed that hysteria is rife or an almost natural state. It would be safer for you to believe that you are likely to meet with it among the very good, the very wise, and the most accomplished women" (xlix. p. 185).

CHAPTER IV.

INFLUENCE OF THE INTELLECT UPON THE INVOLUNTARY MUSCLES.

THE Intellect acts upon the Heart and non-striated muscles with a power similar to that which it exercises over the voluntary or striated muscles, causing coördinate Movements, Spasm and Paralysis.

HEART.—The direction of thought to the Heart has, very generally, an embarrassing influence upon its regular action. It is true, emotional states exercise a much greater and more instant influence; but simple attention to its beats is usually attended by slight, and occasionally by painful, cardiac disturbance. This action of an intellectual, as distinct from an emotional, state is referred to by Sir H. Holland: "There is cause to believe the action of the heart is often quickened, or otherwise disturbed, by the mere centring the consciousness upon it, without any emotion or anxiety. On occasions where its beats are audible, observation will give proof of this, or the physician can very often infer it while feeling the pulse; and where there is liability to irregular pulsation, such action is seemingly brought on, or increased, by the effort of Attention, even though no obvious Emotion be present" (xvi. p. 17).

From the same cause, medical students when their thoughts are directed by their studies to this organ, are frequently sufferers from its disturbed action. Anxiety no doubt comes in here to aggravate the disorder, and will be referred to again under Emotion. Peter Frank himself, even when in advanced life, is stated by Romberg to have been attacked while devoting especial attention to the subject of heart disease during the preparation of his lectures, with such severe palpitations, accompanied by an intermittent pulse, that he felt assured he was affected with an aneurism; the symptoms only ceased after the completion of his labors, and after he had enjoyed the relaxation and diversion of a journey (xxxiv., ii. p. 6).

It is a common remark that medical men frequently die of the disease to which they have devoted special attention. When the coincidence occurs the two circumstances are likely to be placed in the relation of cause and effect without sufficient reason. There is nothing, however, improbable in the popular impression; for a very slight symptom referrible to the organ especially studied by the physician would concentrate his attention upon it, and would be likely to aggravate any previous mischief, and in the case of the heart induce irregular action and ultimately hypertrophy, or some other decidedly organic affection. And yet, probable as this seems, do not a large class of facts appear difficult to reconcile with the supposition? How explain the impunity with which thousands of hysterical persons fancy and firmly believe that they have a particular disease, dwell anxiously upon it night and day, and yet escape without any organic disease whatever? What proportion of medical students have heart disease out of those who after having their studies directed to cardiac maladies fancy they are themselves affected? A small one, we believe. Dr. Armstrong said in one of his lectures, "You will seldom be alarmed at hypochondriasis when it occurs in young subjects. I have, since I have lectured here, had the honor of curing some pupils of extraordinary and dangerous organic diseases by very slight means. I have cured an aneurism of the aorta by a slight purgative, ossification of the heart by a little blue pill, and chronic disease of the brain by a little Epsom salts!"

It must therefore be allowed that while attention to the action of the heart embarrasses its action, and while if disease be actually present it proves mischievous, there is very little evidence to prove that in a healthy organ it would induce more than functional disturbance.

Nowhere are the pathological effects of the Imagination upon the valetudinarian better satirized than in *The Spectator* of March 29, 1710-11, in which the writer of a letter confesses that he first contracted his ill habit of body, or rather mind, by the study of physic. He said that he no sooner began to peruse books of this nature than he found his pulse irregular, and scarce ever read the account of any disease that he did not fancy himself afflicted with. Dr. Sydenham's learned treatise on *Fevers* threw him into a lingering hectic, which hung upon him all the while

he was reading that excellent piece. "I then," he continues, "applied myself to the study of several authors who have written upon Phthisical Distempers, and by that means fell into a consumption, till at length, growing very fat, I was, in a manner, shamed out of that Imagination. Not long after this I found in myself all the symptoms of the gout, except pain, but was cured of it by a treatise upon the *Gravel*, written by a very ingenious author, who (as it is usual to convert one distemper into another) eased me of the gout by giving me the stone."

There are many interesting cases of failure of the heart's action from states of mind which it is not always easy to analyze and to decide upon as regards their emotional or intellectual character. Thus, if a person undergoes a sham operation of venesection, and believing that fainting will be the result, faints, we may be in doubt how far Fear has caused the result. Thus, some years ago, a medical student in Paris, on being initiated into the mysterious rites of a Masonic Society, was subjected to the above process. His eyes were bandaged, a ligature bound round his arm, and the usual preparations made to bleed him. When a pretence of opening the vein was made, a stream of water was spurted into a bowl, the sound of which resembled that of a flow of blood which the student was anticipating. The consequence was that in a few moments he became pale, and before long fainted away. Gratiolet, who relates the story, does not say whether he inquired into the proportion of cases in which syncope was caused by passing through the ordeal of membership. There is a case on record of a man who was sentenced to be bled to death. He was blindfolded, the sham operation was performed, and water allowed to run down his arm in order to convey the impression of blood. Thinking he was about to die, he did actually die. Imagination had the same effect as the reality. But it is impossible to say how much Fear had to do with it; probably a good deal, as in the instance of the man reprieved, after his head had been laid on the block, and the fatal axe was about to fall. The reprieve came too late. The anticipation of death had arrested the action of the heart. Death predictions belong to the class in which Fear may enter largely, and yet in some instances it seems to have been simply a strongly impressed idea, unattended by fear. How far, however, death happens through arrest of the heart's action

one cannot say, but this seems by far the most likely cause. Probably it was so in the following case :

A lady, the daughter of Sir Charles Lee, died at the hour foretold by an apparition. Believers in the reality of ghosts will perhaps not dispute the fitness of such a case as an illustration in point, if we suggest that even a supernatural visitant might, by this principle bring about the event. The apparition, that of a little woman, appeared between her curtain and pillow at 2 o'clock, and assured her that by 12 o'clock that day she would be with her. "Whereupon," says the narrative (xxv., xxvi. p. 262), "she knocked for her maid, called for her clothes, and when she was dressed went into her closet, and came not out again till nine, and then brought out with her a letter sealed to her father, brought it to her aunt, the Lady Everard, told her what had happened, and declared that as soon as she was dead it might be sent to him. The Lady thought she was suddenly fallen mad, and therefore sent presently away to Chelmsford for a physician and surgeon who both came immediately, but the physician could discern no indication of what the Lady imagined, or of any indisposition of her body; notwithstanding, the Lady would needs have her let blood, which was done accordingly. And when the young woman had patiently let them do what they would with her, she desired that the chaplain might be called to read prayers; and when prayers were ended she took her guitar and psalm-book and sat down upon a chair without arms, and played and sung so melodiously and admirably that her music master, who was then there, admired at it; and near the stroke of twelve she rose and sat herself down in a great chair with arms, and presently fetching a strong breathing or two, immediately expired, and was so suddenly cold as was much wondered at by the physician and surgeon. She died at Waltham in Essex, three miles from Chelmsford, and the letter was sent to Sir Charles at his house in Warwickshire; but he was so afflicted at the death of his daughter, that he came not until she was buried; but when he came he caused her to be taken up, and to be buried with her mother at Edmonton, as she desired in her letter."

It may be observed that, assuming that a morbid condition of the brain caused the apparition, the same condition would be a fitting one for the fatal impression received from the creation of

its own fancy. Whether lowering the system by the removal of blood would add to the power of resistance may well be doubted. Probably a powerful stimulant would have saved life.

Further, is it not very possible that her condition after all was one of trance and not actual death? That she was in a partially somnambulistic state is further suggested by her increased musical ability, her master evidently being unaccustomed to such a display.

I defer speaking of the probable channel through which the Intellect affects the heart until the Emotions are treated of, and pass on to the lungs and bloodvessels.

LUNGS.—The functions of Respiration are so closely connected with the Heart that the influence of the Intellect upon them may be referred to here, although involving the action of the voluntary or, as they are appropriately called, the semi-voluntary muscles. As is well expressed by Mr. Wilkinson (xcviii. pp. 108-15), "The breath awaits while the steady-fingering thought explores, and then inspires, not whatever comes, but precise information. Let the reader observe himself when he is feeling for such information, and he will find his curiosity rejoicing in periods of suspended lungs. . . . We *hear* best in breathless attention, and *see* most observantly when the eye-thought gazes unshaken and unprompted by the lungs. It is also to be noticed that the *voice*, which consists of perceptions freed from the mind and launched into the air, is made of the material of the expirations. The mind is breathed out into the social world by the expirations and their pauses, and not by the inspirations. . . . The Imagination, which is the intellect of the passions, builds especial houses in the breath, or, as it is said, forms air-castles. These are its own expirations, in which it revels, for what it draws in is nothing to it, but what it breathes out is all. It does not, however, expire either to do or to die, but to run after its breaths as they sail through the air; not desiring to leave the world, but to propagate its image children in the universal imagery." The same writer also makes some observations on the relations between the exercise of thought and respiration which are true to nature. "Thought is still, and contemplation breathless; each involving, first, fixed breath, and, second, a small expiring; and so on, until the thought is traversed, or the effort ends and begins anew. . . . To the senses, suspended animation is

suspended consciousness; to the intellect suspended animation may be life, thought, and supreme wakefulness. . . . Intellect touches so near upon trance, that the highest cases of either involve common phenomena, and exist in the same persons."

Several striking examples of respiratory spasm assuming the characters of croup occurred in 1880 in the Pennsylvania University Hospital, and have been recorded by Dr. Weir Mitchell (l. p. 71). The patients were children in the Church Home for Children, and these attacks were induced by imitation of other children. One child of ten was supposed really to have a sharp attack of croup; her breathing was hard, gasping, crowing; she was speechless, and wildly clutching at her throat. When free from spasms, "the approach of a nurse with medicine, or the visit of a manager to the Infirmary started her off anew." Six or seven inmates became affected in the same way. They rapidly recovered when scattered about in different hospitals (l. p. 74). The mimicry of disease in these cases was well exemplified.

BLOODVESSELS.—Sir Henry Holland, in the essay already referred to, observes that he has reason to think that "hemorrhage (as in the simple case of epistaxis) is often increased by Attention, but whether by excitement to the heart's action or by direct influence on the vessels of the part cannot easily be decided. Concentrated attention, moreover, will frequently give a local sense of arterial pulsation where not previously felt, and create or augment those singing and rushing noises in the ears, which probably depend on the circulation through the capillary vessels."

The singular phenomena of Stigmata may be fittingly referred to here, for so far as they are genuine and not caused by mechanical irritation, they arise from the mind's influence on the capillary circulation through the vaso-motor nerves. No one has treated the subject in a more luminous manner than M. Alfred Maury, who forcibly observes that ecstatic mysticism, including these remarkable appearances, is "the most striking proof of the influence of the Imagination upon the body, and is truly a miracle, in the sense of being one of those marvellous effects of the laws of thought, whose secret escapes and whose extent confound us." He admits the fact of stigmatization (after making the allowance he considers necessary for imposture and exaggeration), and explains its occurrence, so far at least as the reference of the phenomena to a certain group of psycho-physical facts may be

regarded as an explanation, by a consideration of the influence of dreams upon the skin. In mentioning those cases in which persons have dreamed that they received blows or wounds, and in the morning have found marks of inflammation on the body, and which sometimes, in the course of a day or two, become ulcers, he observes that "just so with visionaries, under the power of the Imagination, by the concentration of the Attention, the blood is directed to the place where they fancy they are affected" (xxxv., 1855).

M. Maury's description of the experience of St. Francis d'Assisi, whom he regards as the ancestor of the stigmatized, is much to the purpose. We shall make free use of it here. One day when exhausted by fast, and absorbed in reverie and prayer, he imagined that God ordered him to open the Gospels in order that he might there learn his will. "Open me the Holy Book," he exclaimed to a friar. Three times was this done, and three times it opened at the account of the Saviour's passion. St. Francis regarded this as a proof that he must carry his imitation of Christ much further than he had hitherto done. Bodily mortification he had doubtless practised, and had crucified his desires, but he had not yet subjected his body to the sufferings of the cross, the penance now evidently required by the Almighty. One thought, one definite idea, henceforth occupied him—his Master's crucifixion. His Imagination revelled, so to speak, in all His sufferings. He strove, while fasting more and more, and praying more and more intensely, to realize them himself. On the anniversary of the Exaltation of the Cross, resigning himself more than ever to one of these ecstatic contemplations, he imagined he saw an angel descend from the vault of heaven, and approach him, the hands and feet attached to a cross. As St. Francis contemplated this vision, full of profound delight and astonishment, the seraph suddenly vanished. But the pious anchorite experienced from this spectacle a strange reaction, and his whole system was more than ever permeated with the idea of the realization of the physical sufferings of Christ in his own person. He then suffered pain in his hands and feet, and this, we are told, was succeeded by inflammation so severe as to terminate in ulceration. These wounds he regarded as the stigmata of the Saviour's passion.

It might not be safe to take this or any other saintly narration

as a *proof* of so remarkable an influence upon the body, but when viewed by the light of facts coming within our own knowledge, we have, I think, no sufficient reason for rejecting the major portion of such an experience as this. So clearly defined an idea, so ardent a faith intensifying its operation, were sufficient to reflect it upon the body. We may accept some physical result, instead of soiling the fair fame of St. Francis d'Assisi with the charge of pious fraud—always an easy escape from scientific difficulties, but one which, we venture to say, will be less and less resorted to, as the sole explanation of puzzling phenomena, as we understand better the delicate *nexus* which unites body and mind in inseparable union.

The periodicity of stigmata is a further interesting illustration of the influence of attention and imagination upon the direction and localization of the cutaneous circulation. On saints' days and on Fridays, the seat of the marks became more painful, and a brighter color indicated a fresh afflux of blood to the part, the mystic's thoughts being specially concentrated upon the passion.

Since the first edition of this book was published, the case of Louise Lateau, the "Stigmatisée" of Bois-d'Haine Hainaut, Belgium, a young woman of twenty-four at the time when the appearances here described were recorded, has attracted much notice. The Royal Academy of Medicine of Belgium appointed a Commission to decide whether an article by M. Charbonnier, entitled "*La maladie des mystiques: Louise Lateau*," should appear in one of the Academy's publications. This Commission, consisting of MM. Fossion (who did not act), Mascart, and Warlomont, deemed it necessary, in order to form a satisfactory opinion, to examine Louise herself. The report of this medical commission, engaged for five months in the investigation, is the best authority¹ we are likely to have as to the real facts of the case. Is it a fact that she manifested the stigmata? If she did, what is the explanation arrived at by the Commission? Does it accord with the principles applied to the explanation of other phenomena detailed in this work?

It should be premised that, from her infancy, Louise was constantly given up to religious exercises. She had a special devotion

¹ M. Warlomont takes Descartes's precept as his guide, "Ne tenez jamais une chose pour vraie que vous ne la sachiez vraie, et faites partout des dénombrements si parfaits et si complets que vous soyez sûr de n'avoir rien omis."

"pour les douleurs du Golgotha." Long before her first communion, which took place when she was eleven, "Elle savait méditer sur les grands mystères, bien qu'elle n'eût appris de personne la méthode de la méditation. Toute petite, elle aimait à répéter les doux noms de Jésus et de Marie; elle avait une grande dévotion pour la passion du Sauveur, faisait souvent le chemin de la Croix, assistait assidûment à la Sainte Messe, et priait depuis longtemps son chapelet chaque jour."¹ One night, April 15, 1868, she fell into a state of ecstasy, and continually talked in a religious strain. She saw the Virgin, and several of the saints. This condition lasted till the 21st, and was followed by the appearance of the stigmata. Blood oozed from the left side on Friday the 24th, it returned on the Friday following, when blood also transuded from the feet; and on the following week from the palms of the hands likewise. Lastly, on the following Fridays, these hemorrhages returned, until September 25th, when, for the first time, blood flowed similarly from the forehead. The attack, as it is called, lasted at first seven or eight hours, but at the time of the Commission, only two hours and a half. While it lasted, Louise "became insensible to all external stimuli, appeared to be present at the drama of Golgotha, and revealed by a well-marked mimicry, the emotions by which her mind was affected" (xlvi. p. 15).

M. Warlomont's report commences with the 18th of September, 1874. He gently removed the dried blood which he found on the forehead, and on examining the skin with a lens he failed to discover any scratch, but only some brown points resembling particles of coagulated blood. The skin was shining and remained clear, after being washed, the rest of the day. On examining the hands he found sanguineous spots, the blood flowing at the time so continually that it was difficult to see clearly the bottom of the wound, but, examined by a lens, the papillæ of the skin were found to be red and swollen, resembling fleshy pimples. The feet were not so carefully examined, and the side not at all. On the right shoulder was a wound, presenting drops of serum scarcely tinged with blood. A priest then administered the sacrament, Louise kneeling on the stone floor, with her eyes closed, and her hands crossed, over which the communion cloth

¹ Louise Lateau, *la Stigmatisée de Bois d'Haine*, p. 13. Bruxelles, Closson et Cie., 1873.

was extended. Then she passed into an ecstatic form of hypnotism; her immobility resembled marble, her eyes were closed. On raising the lids, the pupils were found to be widely dilated, fixed, and insensible to light. On handling the parts surrounding the wounds, which before had been painfully sensitive, there was not the slightest indication of suffering. Pinching the skin elicited no sign of feeling; in fact, there was everywhere complete anæsthesia, with the exception of slight sensitiveness of the cornea. The pulse, which before was 120, fell to 100. When she returned to consciousness she appeared to be coming out of a deep sleep. The blood was still oozing from the wounds. The sensibility gradually returned. The pulse rose again to 120. The muscular sense was abnormal; the patient not knowing, without looking, in what position a limb was placed.

Louise passed into a state of ecstasy at an expected time—a quarter past two o'clock in the afternoon. Before doing so the pupils were slightly contracted; the eyelids almost closed; the eyes expressionless. When, however, the ecstatic crisis had commenced, the eyes, open and dull, were fixed upwards, and directed to the right, the pupils dilated and almost insensible to light. She knew nothing of what was going on around her for a couple of hours. This was the *first* stage; the *second* was that of genuflexion, in which she clasped her hands and remained in the attitude of contemplation for a certain time. A *third* stage was marked by the patient prostrating herself upon the ground without any rigidity. After a while she made a rapid movement, the arms were extended in the form of a cross, and she remained in one attitude for an hour and a half.

During the ecstasy, the flow of blood from the stigmata was considerable; the skin insensible.

The pulse fell to 70 in the third stage, and was scarcely perceptible; the respirations became very slow, and the respiratory murmur feeble.

On one of these occasions the late Mr. Critchett was present. His son (Mr. G. A. Critchett) informs me that he was satisfied of the genuineness of the phenomena, and attributed them to vicarious menstruation.

M. Warlomont constructed an apparatus in which the right hand was enclosed for twenty hours before the wounds appeared, and every means appears to have been taken to render it impossible

for Louise to obtain access to her hand, the nails being also carefully cut close. Still the hemorrhage occurred. The blood was examined under the microscope.

The conclusion arrived at as regards these ecstasies and stigmata was that simulation was altogether precluded. "The stigmata and the ecstasies are real. They can be explained physiologically" (xlvi. p. 193).

The explanation offered by M. Warlomont is fully in accordance with the psycho-physical laws recognized in these pages, and also the suggestion made by Mr. Critchett. I may add, that in a recent letter from M. Warlomont he informs me that he has seen no reason to alter his views. The profane are not now allowed to study the case.

There was, then, the long preparative stage of constantly dwelling upon one set of ideas—ideas definitely associated with certain localities of the body, in a neurotic girl. Concentration thus localized was followed by vaso-motor disturbance and congestion of the spots to which the thoughts were so intensely directed. Not only might passive transudation of blood occur at last, but the irritation occasioned would inevitably lead the girl to rub the skin, and so greatly aid the tendency to hemorrhage. Then, again, the condition of ecstasy would serve to accentuate the determination of blood to the affected parts, not only by the peculiar effect produced on the circulation as shown by Braid, but also by the association established in Louise Lateau's mind between this state and the stigmata.

The periodicity of the stigmata is rationally accounted for by the ideas with which they originated having been associated with certain days; and by the weekly direction of thought and feeling in the same channel.¹

¹ Cf. among other works bearing on this subject: Louise Lateau, sa vie, ses extases, ses Stigmates; Étude médicale. Louvain, 1873. Par Lefebvre, Professeur à l'Université Catholique de Louvain. Les Stigmatisées (Louise Lateau, Sœur Bernard de la Croix, etc.). Paris, 1873. Par A. Imbert-Gourbeyre, Professeur à l'École de médecine de Clermont-Ferrand. Biographie de Louise Lateau, la Stigmatisée de Bois d'Haine. Par Van Looy. Tournai, Paris, Leipzig, 1874. Louise Lateau, la Stigmatisée, d'après des Sources Authentiques, médicales et théologiques. Par H. Rohling. Traduit de l'Allemand, par le Dr. Arsène de Noné, Bruxelles et Paris, 1874. Louise Lateau, ihre Wunderleben und ihre Bedeutung im deutscher Kirchenconflicte. P. Mayjuncke. Berlin, 1875. In the above-mentioned pamphlets the case is described from a theological point of view, and regarded as miraculous. Science et miracle. Louise Lateau ou la Stigmatisée belge. Par Bourneville.

The relation of the intellectual operations or the functional activity of the brain to the condition of that organ during *sleep*, is a subject of great interest and requires some notice when we are considering the action of mental states on the bloodvessels. There are two aspects of the question which present themselves, *first* the possibility of the intellect causing the condition of sleep, and *second*, the absence of intellectual activity, in other words, the condition itself. It will be most convenient to consider the second point first, and then to see how far we can imagine, on theoretical grounds, sleep being induced as indicated in the former proposition.

From the undoubted fact that deep sleep is a condition of cerebral inactivity, it has been hypothetically assumed that the blood-supply to the brain in that condition is diminished, and the proof of this position was afforded by various authors as Durham, Moore, etc. At the same time this can hardly be considered to express the whole physiology of sleep, since partial anæmia of a nerve centre is followed sometimes by convulsions, while, in addition, the first stage of sleep is evidently connected with changes which have gone on in the nerve corpuscles of the cortex of the brain, since the necessity of sleep arises at a point where the corpuscles are in a state of fatigue—the state of the circulation remaining unaltered. But even this enlarged consideration of the problem cannot be accepted as expressing the whole process carried on in the brain, for it is a matter of common observation that, supposing the muscular system to be fresh and unwearied, the cerebral corpuscles will continue to work for a very considerable time without the necessity for sleep making itself felt; while, on the contrary, it is a matter of every-day experience that physical exercise is the most powerful cause of profound slumber. So that on the whole it is not improbable that under ordinary circumstances the physiological conditions attendant on the first stage of sleep, are, on the one hand, fatigue of the cerebral corpuscles, and on the other, the increased percentage of carbonic acid and excretory products in the blood.

Paris, 1875. *Les miracles* (Revue des Cours Scientifiques, 1875). Virchow. In these works, as in Warlomont's, miracle is doubted, and the phenomena are attributed either to a morbid state or to deception. Legrand du Saulle, in his recent work, *Les Hystériques* (lii. p. 152), observes that stigmata in general belong to the group of "hématidroses." I am much indebted to M. Morel, of Gand, for valuable information in regard to L. Lateau.

This broader view of the physiology of sleep does not lose sight of the coexistence of partial anæmia of the nerve centres, since this necessarily results from their inaction. Although no doubt the vaso-motor centre in the medulla helps to determine the calibre of the cerebral vessels, it is not necessary to assume that its primary stimulation occurs until the activity of the cortical corpuscles begins to diminish, the diminution of blood supplying the part being strictly comparable to the diminution of blood-supply to a muscle at rest.

From this standpoint we may now consider more fairly the question of the possibility of the intellect directly causing the condition known as sleep.

The cases in which sleep can be said to have been produced by intellectual effort are very rare, inasmuch as the instances which would occur to the reader, simply resolve themselves into the voluntary exclusion of sensory impressions, and thus the system is placed in a condition favorable to sleep, since sleep is a synonym for cerebral rest, while the operation of the intellect means cerebral activity. To assert the possibility of the former being immediately caused by the latter is evidently an assumption, and, therefore, those instances on record, such as the case of Napoleon, which appear to favor it, may be regarded as only examples of what we have just stated, namely, the adoption of such conditions as favor sleep.

It is true that one intellectual function, namely, Attention, may be said to be followed by sleep, but here it results from cerebral exhaustion, and sleep, therefore, in this instance is only an indirect consequence of an intellectual process. Of the influence of Expectation we shall speak presently, and need only remark here that, although not so clearly in accordance with the above-mentioned principle, it would appear to resolve itself into a modified form of Attention.

If the foregoing views of the relation between mental action and the production of sleep be correct, their bearing will be recognized on Mr. Durham's observations, and Mr. Moore's ingenious theory of the causation of sleep, that the inhibitory action of the brain on the vaso-motor centre is suspended. Thus, if it is not proved that the cerebrum exerts an inhibitory action upon the sympathetic, we may say that the usual influence of mental activity is to dilate the vessels, and that when exhaustion of the

cerebral corpuscles occurs, and this stimulating action is withdrawn, the vaso-motor contractors come into full play and lessen the calibre of the cerebral vessels—a concomitant but not a cause of sleep.

Illustrations of the influence of Expectation (whether or not acting directly on the vessels) in causing sleep, and in inducing waking at a certain time, are not difficult to find. In many persons, as is well known, and as Sir John Forbes demonstrated, it is only necessary to expect sleep and it supervenes, while a person impressed with the idea that it will not come, may be rendered restless for hours. Dr. Elliotson, in describing a case of mesmeric sleep in a female, says, "Mere imagination was at length sufficient, for I one day told her that I would retire into the next room and mesmerize her through the door. I retired, shut the door, performed *no* mesmeric passes, but tried to forget her, walked away from the door, and busied myself with something else—even walked through into a third room; and on returning in less than ten minutes from the first, found her soundly asleep, and she answered me just as was usual in her sleep-waking condition" (xxxvi., 1846, p. 47).

Mental hypnotics were found by Professor Laycock to be "singularly successful in those cases in which there is a morbid apprehension as to sleepless nights and a hypochondriacal anxiety for sleep." It is often the morbid feeling alone, as he observes, which prevents sleep, and he adds, "this is proved by the circumstance, as repeatedly witnessed in my practice, that any simple remedy administered to the patient so as to impress him with the conviction that it will cause sleep, is followed by sleep, and sometimes, when convalescence is approaching, by as prolonged a sleep as if a narcotic had been taken. In one case of this kind the long sleep which followed upon a *placebo* excited alarm" (*Edin. Medical Journal*, November, 1862).

Still more remarkable, the effect of a purgative pill has been rendered *nil*, and comfortable sleep induced in the place of insomnia, by the belief that an opiate has been administered. Such a case is related by Dr. Noble, the pills consisting of ext. col. co. gr. viij, and cal. gr. ij!

On the other hand, what is called "waking at will," must be referred to the influence of an expectant idea as much as going to sleep. Many persons can ensure waking in the morning at a

certain hour by strongly fixing the attention upon the time desired just before falling asleep. This affords an excellent instance of mental activity, without consciousness of the process, the person being, in fact, asleep at the time the latent idea comes into operation. This familiar fact involves an automatic calculation of the lapse of time. The Fakir before passing into his hibernating trance determines when he shall awake, and strongly impresses upon his mind the day or even the hour when he shall revive; and revive he accordingly does. The late Sir James Simpson, at a meeting of the Edinburgh Medico-Chirurgical Society, referred to a striking case witnessed by three physicians, in which a person "biologized" was commanded to sleep thirty-five hours, and did so, "with two short intervals of permitted awakening" (xxiv., 1847, p. 486).

In this connection, it may be observed that it is often much easier to act automatically, in getting out of bed, when tempted to indulge in further rest, than to bring the Will to act upon the muscles. I wake from sleep, and wish to rise. Reason strongly urges the act. The Will fails; not a muscle moves. Now, if I cease to endeavor to excite movements by volition, and divert my mind to another subject, I find that while thinking of something else, I am on my feet. A parallel case is the ease with which we often remember a circumstance or a name by not thinking of it, but of another matter, after fruitless efforts to recall it by the Will. As I write, a little boy vainly endeavors to remember the tense of a Latin verb. I make him change entirely the current of his thought, and suspend the action of the Will, and the forgotten tense comes back to his memory by automatic cerebral action. In Macgregor's *Thousand Miles in the Rob Roy Canoe* occurs an incident which will illustrate the same principle. He says, "when on the Meurthe three women were seen on the banks of the river, in great alarm, who searched in vain for two boys supposed to have gone away to fish, but missing for many hours." They eagerly asked Mr. Macgregor to tell them whether he had seen them, and implored him with tears to advise them what to do. "I tried," he says, "all I could to recollect; but no! I had not seen the boys, and so the women went away distracted, and left me sorrowful. But *suddenly*, when toiling in the middle of a very difficult piece of rock-work, lowering the boat [and therefore no longer trying to remember], *I remembered*

having seen those boys, so I ran over the fields after the anxious mamma, and soon assured her that the children had been safe an hour ago." Such are the involuntary operations of the cerebrum, when assisted by the suspension of the Will, as exhibited in these instances; and still more strikingly, when in sleep, this unconscious activity, working to a definite end, produces those changes in the relative force of the sympathetic ganglia and the cerebro-spinal system by which the brain is restored to its waking state. Dr. Cuthbert, in a letter to the *Medical Times and Gazette*, November 5, 1859, on the "Ulster Revivals," observes in regard to the "subjects," that "one of their most remarkable endowments was the power of producing sleep, and of awaking at a specified time."

Dr. Laycock, referring to the circumstance of young women in peculiar states of the system, "stating the hour when a watch is placed to the nucha or epigastrium under circumstances such that the patient could not have previously known it," observes, "Somehow or other people know what o'clock it is when asleep, and without watch or clock near them; and will awake at a time fixed on over night to the exact moment. I have myself, more than once, awoke within two minutes, and frequently within five minutes, of the hour so fixed; for instance, at three o'clock in the morning, when my usual waking hour was seven; and I have awoke at the hour at once, from what has appeared to be a profound slumber. Now, something of this kind may occur in the cases alluded to above" (iv. p. 324).

The influence of mental states on the bloodvessels aids in determining a rise of *Temperature*. Dr. Lombard, who commenced a series of experiments, in 1866, with thermo-electric apparatus, on the temperature of the head when the mind is at rest, and in a condition of functional activity, demonstrated that the use of the higher intellectual powers was followed by a distinct rise of temperature in the head. Arousing the Attention alone sufficed to induce this result (xci., 1879, p. 3). Professor Schiff, in the following year, arrived independently at similar results from observations made directly upon the brains of animals (xcii., t. iii. p. 6, 1870). Broca and Paul Bert arrived at the same conclusions (xxxii., April 19, 1879).

Dr. Lombard shows that although in every brain the performance of intellectual work may be supposed to be attended with

thermal changes, yet these differ in different individuals, and in the same individual with different kinds of work. Two conditions are, he finds, usually essential to the production of heat appreciable on the outer surface: first, that the work be continuous for some minutes; and second, that the intellect operate with considerable intensity. Although, however, these conditions combined are much more effective, prolonged application, not intense, may cause the same effects. It is very difficult to detect any rise of cerebral temperature in those who work leisurely. The intellectual work performed must be, Dr. Lombard observes, "of a nature either to present some considerable difficulty in its accomplishment, or decidedly to interest the individual. For example, persons who are not in the habit of expressing their ideas in writing, may be made to raise the temperature of the head by earnestly endeavoring to write upon a given subject, even when the latter has been on the mind for some time, and has been fully discussed, the work being thus limited to the simple composition. Not so, however, with the brain accustomed to composition, even when the subject written upon is a difficult one. In like manner no effect is produced in persons accustomed to mathematical work, by giving them problems to solve or sums to compute, unless either the task be one of unusual difficulty, or, as in the case of the addition of figures, the condition of unusually rapid performance of the work be imposed. If the interest be strongly excited, good results are often obtained, although the amount of absolute intellectual effort may be comparatively small. This is illustrated by the effect, in some persons, of the reading of interesting books or of conversation of a like character" (xci. p. 123).¹

The form of mental work in which the subjects were employed was as follows: (1) Mathematical calculations of considerable difficulty, performed rather slowly. (2) Arithmetical computations performed as rapidly as possible. (3) Making notes of subjects requiring considerable reflection. (4) Putting into writing, ideas difficult of expression.

It was found that in the individual experimented on, the greatest effect, both as regards degree and rapidity of rise of

¹ "The first lesson to be taught the subject is to *stop thinking, at will*. Practice in this, and tact in the experimenter in diverting the mind of the subject from trains of thought, or in leading the mind into such trains, constitute a large part of the requirements of successful experimenting" (p. 123).

temperature, was caused by *composition*; the next greatest effect was caused by *rapid arithmetical computations*; and the least effect by *making notes* (p. 132). But no rule can be laid down, for the degree of interest felt by the worker in different subjects of study modifies the results.

With regard to the regions of the head in which the rise of temperature is most marked, Dr. Lombard, who in his first experiments arrived at the conclusion that the posterior region indicated the maximum rise, subsequently found from a larger number of observations that the order of regions, with regard to both degree and rapidity of rise of temperature in all four kinds of work specified, was (with some exceptions) 1st. Anterior region; 2d. Middle region; 3d. Posterior region.

ALIMENTARY CANAL.—At the Westminster Medical Society, Mr. Quain related the following case, which strikingly illustrates the influence of involuntary Attention: "A gentleman, who had constantly witnessed the sufferings of a friend afflicted with stricture of the œsophagus, had so great an impression made on his nervous system, that after some time he experienced a similar difficulty of swallowing, and ultimately died of the spasmodic impediment produced by merely thinking of another's pain" (xxxviii. p. 273).

The rejection of the contents of the stomach from a purely mental state is well exemplified in an experiment made upon one hundred patients in a hospital, and reported by Dr. Durand (de Gros) in his able work *Essais de Physiologie Philosophique*. The house surgeon administered to them such inert draughts as sugared water; then, full of alarm, he pretended to have made a mistake in inadvertently giving them an emetic, instead of syrup of gum. The result may easily be anticipated by those who can estimate the influence of the Imagination. *No fewer than eighty-four-fifths*—were unmistakably sick. How many of the rest suffered from nausea is not stated. We need not approve of the pious fraud of the *infirmier*, but the experiment having been made, it is a pity so many people should have been rendered miserable without good use being made of their discomfort. In regard to misleading patients generally, even *causâ scientiæ*, one of the practical difficulties the investigation into the influence of the Imagination presents, is certainly the unseemliness of making experiments of this nature, and the danger of sully- ing that strict

honor which by no profession is more prized or maintained than by the professors of the medical art.

The often quoted experience of Van Swieten illustrates the influence of an idea, apart from Imagination or Expectation, in exciting an act which had originally been excited by an impression from without. He relates that he once passed a dead dog in a state of putrescence, and the stench caused him to vomit. Having occasion to pass the same place, *several years afterwards*, the circumstance was so vividly recalled, that he could not help vomiting. Clearer proof could not be found of the action of a mental image, or a subjective impression (a foreseeing, Unzer would say) upon the muscular system. Such a case might be, perhaps, more correctly given under the head of Sensation, for recollection of the circumstance most likely involved a resuscitation or revival of the former accompanying olfactory and nauseating sensations. In a medical point of view, associations are, from their immense influence, of the greatest importance, in nervous affections especially; and are frequently the foundation and explanation of the bodily and mental phenomena little suspected by the physician, and concealed by the patient, who is ashamed to acknowledge the circumstance.

The most trivial matter attaches certain ideas to certain places, persons, and especially articles of dress, to which they cling with a tenacity which is truly surprising unless the influence of the association of ideas and the automatic action of the brain be considered. When the image called up is disagreeable, it will haunt the mind grievously, and may at last cause acts over which the Will has no longer any control, and which are those of a madman. Locke calls the association of ideas a disease of the understanding, and it may certainly prove as mischievous in inducing bodily and mental diseases as it is pernicious in the employment of the reasoning powers, and the search after moral truth.

Van Swieten says (xl. p. 414), "I have seen a man who had taken a sufficiently nauseating draught, not only shudder and be nauseated, but also be frequently purged, when he merely saw the cup in which he had taken the medicine; and adds, "*Sic sola idea fastidiosi remedii renovata purgantis pharmaci vices supplevit, et totum corpus turbavit.*" He compares this to our thinking of sadness or even feeling sad, when we merely see the *word* sadness although it has only an arbitrary connection with it.

The efficacy of an ideal purgative in exciting the peristalt

action of the intestines is well illustrated in the following cases. The latter of the two is the more valuable from being the personal experience of a medical man.

The other day a lady nurse, at the Plymouth Hospital, told me of a patient in one of the female wards, who was much disconcerted at the doctor having left the hospital without ordering an aperient pill, as he had intended to do. The nurse procured a bread-pill, and satisfied her mind. Next day she found, on inquiry, that it had answered its purpose satisfactorily.

"Dr. S—, all his life had the greatest horror of taking medicine, although fully admitting the beneficial and necessary effects of it, and constantly prescribing it judiciously for others; he consequently never took it. After a certain period of life, however, he began to experience a torpidity of the bowels and all the consequent uneasiness, rendering it apparent to himself that relief could only be obtained by the means he prescribed to his patients; namely, the taking of medicine. After due deliberation, accordingly, and conflict with himself, he decided upon taking some, and imagining that an ordinary dose of salts would answer all the purpose, and be less nauseous than most others, he carefully mixed one, and laid it by his bedside at night to be taken in the morning when he first woke. The proximity of it, however, and the impression on his mind of the horrible dose which awaited his first waking, banished sleep from his eyes, and kept it continually before him. At length, however, he did sleep, and even then the vision did not leave him, but, like the haunting phantom of the roasting pig to the slumbering glutton, it assumed various guises and positions to his mind, the difference alone being that his was more purely imaginary, as he had not swallowed the cause of the mental disturbance, which the other had, but suffered from the anticipation. At length, however, he awoke, and so far from requiring the prepared medicine found all occasion for it removed by an effort of nature, and from that time he declares that he has nothing to do when suffering from torpid bowels but to lay a dose by his bedside at night, and that it as effectually acts as if he had swallowed it" (xli. p. 64).

Crichton quotes from Pechlin the case of a student at Leyden, who, in want of a purgative, looked in the index of a medical work for the word "pill," which he supposed must be a purgative, and took one containing opium, hyoscyamus, and astringents, and was accordingly purged as he desired (lxiii., ii. p. 446).

CHAPTER V.

INFLUENCE OF THE INTELLECT UPON THE ORGANIC FUNCTIONS.

THE Intellect may powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.

The consideration we have already given to the influence of Intellect, in its various aspects, upon the muscles engaged in the vascular and respiratory systems, has, at the same time, exhibited to a considerable extent its actions upon the functions of organic life. The part played by the involuntary muscles in the processes of secretion and nutrition is so important that the two cannot properly be separated, and the present is in fact a continuation and supplement of the previous chapter.

As mental activity affects the respiration, and the circulation and aërication of the blood, its influence on secretion and nutrition might be predicated even without proceeding more deeply into the causes of this influence. But the question which at once arises, whether these variations in the circulation of the blood in the organs and tissues adequately account for the alterations in nutrition and secretion, now referred to, deserves consideration here.¹ Let us first notice the conclusion arrived at by Cl. Bernard. Admitting that the nervous system exercises an incontestable influence upon these processes extending to their chemical phenomena, he maintains (xciii.) that all this can be accounted for by the action of the nervous system upon the circulation of the blood, and that there is no occasion to have recourse to the direct influence of nerves upon nutrition and secretion. He refers to the starch transformed in a vegetable cell into sugar, due to the action of certain ferments, as also some special conditions of temperature; and points out that in animals we find the same conditions,

¹ The remarks which follow apply equally to the mode of action of the Emotions upon the same processes.

the same ferments, with this difference only—in vegetable life the phenomenon is produced under the influence of the sap, germination, etc.; in animals, on the contrary, it is dominated by the nervous system (though that this is not essential, is seen in the embryo), “which acts directly upon the vessels, and the modifications thus produced in the vascular system react upon the chemical phenomena.” He believes that both sympathetic and cerebro-spinal motor nerves act upon the vessels: the former, acting as moderators, contract them and lessen the supply of blood; the latter, on the contrary, when stimulated, cause the vessels actively to dilate. “Voilà tout le mecanisme de l’influence nerveuse.”

Bernard’s experiments on the submaxillary gland seemed to show that the whole process was explicable by what we know concerning vaso-motor action, but later observations, notably those of Ludwig (*Arbeiten an d. Physiolog. Lab. a. Leipzig*), show that this expresses only one side of the question and that a second element exists, viz., the direct action of the facial nerve on the secreting corpuscles. This is completely illustrated by the crucial experiment of stimulating the facial nerves in the head of a decapitated animal, the result being increased secretion of saliva, the blood circulation being in this case of course out of consideration.

The action of the chemical phenomena is augmented whenever the nerves derived from the cerebro-spinal system antagonize or paralyze the influence of the sympathetic nerves, thus allowing of more blood and a high temperature; phenomena which may result from the suspended action of the sympathetic, or the increased action of the cerebro-spinal nerves. On the other hand, when the sympathetic is stimulated, and the calibre of the vessels is lessened, the chemical phenomena diminish. In the illustration he employs of the submaxillary gland, the antagonizing action of the chorda tympani upon the sympathetic is supposed to cause an afflux of blood to the gland, the cells of which contain certain special chemical principles which this blood serves to dissolve, and so excites the function of the gland. Secretion is the peculiar characteristic of the glands, as contraction is of muscle; “the accumulation of a peculiar compound within its primitive cells is the exclusive privilege of the glandular tissue; a watery menstruum is then poured forth to dissolve this substance and convey it into the excretory ducts.” A sufficient supply of blood

is required to create the ferment or active principle of each secretion. Motion is necessary for this, although a chemical process; and for motion, muscle is indispensable. Thus, although the nervous system cannot create new histological elements, "it sets forth their characteristic properties;" it can retard or accelerate the secretive process, and this is done by the muscular apparatus. "A new chemical compound is created through its action." On this hypothesis, therefore, the nerves do not directly interfere with organic chemical phenomena as galvanism acts upon inorganic matter, but only through the circulation. "The terminal ramifications of the nervous system do not float in the liquids of the economy," and therefore a distinct mechanism—the muscular apparatus of the vessels is required to enable these nervous fibres "to modify the composition of these fluids" (xlv., April 27, 1861). But sufficient as the position taken by Bernard¹ was for the purpose of showing how varying mental states must influence the organic functions by acting upon the nerves (whether sympathetic or cerebro-spinal) which regulate the calibre of the vessels, it has failed to commend itself as the whole truth.

It has in fact been demonstrated, and is not now disputed, that nerves may act directly upon cells, pigmentary, secretory, and other, although it does not follow that there is a distinct set of trophic nerves. It is true as Prof. Rolleston observes in regard to the influence of defeat upon an army, in making it readily succumb to dysentery, scorbutus, and malaria, or of goal life upon prisoners, there is no clear indication as to whether they are produced by vascular changes, or by the direct action of nerves which cause intracellular, molecular disturbance, but other instances unquestionably show, as we have seen, that nerve force can act directly on tissues without the intervention of bloodvessels.

Lister's observations on the pigmentary cells in the web of a frog's foot have proved that change of color is there "dependent

¹ In his *Lecons de Pathologie Experimentale*, 1872, Claude Bernard repeated his sentiments in the following among other passages: "Dans les vaisseaux comme partout ailleurs, c'est toujours sur un élément contractile que se porterait l'action des nerfs: l'anatomie microscopique vient ici en aide à la physiologie pour démontrer dans les parois vasculaires l'existence évidente de ces mêmes éléments. Si dans les glandes et dans d'autres tissus cette démonstration n'est pas donnée, ce n'est pas un motif pour admettre les nerfs trophiques agissant d'une manière chimique directe, et dont on a invoqué l'existence pour expliquer les phénomènes sécréteurs" (lxviii. p. 311).

upon molecular movements carried on in the interior of cells under the influence of the nervous, and under circumstances which exclude the intervention of the blood-vascular system" (xlvi.); and, as Prof. Rolleston observes, "A force which can be seen to produce molecular movement within a pigment-cell, may well be supposed to be competent to produce nutritional or chemical changes in the interior of cells of other characters" (xlvi., loc. cit.).

In regard to secretion, although vivisections seem to prove that it can be arrested or excited through vaso-motor nerves, the peripheral termination of sympathetic nerves in glands, as traced by Pflüger and Kupffer, suggests their direct action on the secretory process, as efferent nerves, although some maintain that these are afferent nerves, the influence of which, proceeding *a fronte*, is reflected upon those which regulate the calibre of the vessels.

While, then, we can entertain no doubt as to the fact that mental states dilate and contract the small vessels which convey nutriment to the cells of glands and tissues, and that this alone would go far to account for the phenomena which result from Attention, the Imagination, and various forms of ideational activity, it is certain, we repeat, that there is also an influence directly communicated from the mind to the organic cells, whether through sensory, motor, or distinct trophic nerves.

Illustrations of the influence of ideas upon Secretion—the representative states of consciousness which Imagination, both in its recollective and constructive or creative form, comprises—will readily occur to the reader. Unzer expresses the truth very clearly. "Many glands pour out their secretions from Imaginations." The mental image or idea must, of course, be in relation to the secreting organ.

The salivary glands are so notably affected by ideas that they are frequently referred to. We know that the mere idea of food is sufficient to excite the function of these glands. To procure sufficient saliva for his experiments, Eberle vividly imagined acid fruits. If a teaspoonful of colored water be placed in the mouth under the impression that it is tincture of pellitory, the amount of saliva will be considerably increased. In the hypnotic state this would be still more effective. Just as spasms or convulsions are more likely to happen when the will is suspended and the

cord acts independently, so when the controlling power is removed from the brain, its automatic action is intensified, and ideas exert much more power over the organic functions when directed towards them. There is a constant antagonism between voluntary and involuntary actions, and when anything occurs to neutralize the former, the latter rule the hour. One reason why the emotions act so much more powerfully upon these functions is, because they are less under the control of volition than the intellectual faculties are, besides being probably in much closer anatomical relation with the nervous centres which influence the vascularity of the secreting glands.

The influence of Attention on the mammary glands is well recognized. The case of a lady is recorded by Dr. Parry, who, after the period of nursing, was accustomed to have milk secreted whenever she heard a child cry. Reflex action of the encephalic centres specially related to the organic functions is here well illustrated.

The secretion of gastric juice is increased by the idea of eating, as proved by experiments on men and dogs with gastric fistulæ.

As regards the secretion of the liver, we may refer here to what is called a "bilious" headache when brought on by overwork at the desk. Any one given to study can trace such an attack from its earliest stage. Dr. Latham, of Cambridge, in a *Clinical Lecture on Nervous or Sick Headaches* (xxxii., March 23, 1872), states that he meets with a great many cases (sufficiently severe to require treatment) both in males and females, but "perhaps in a University town, owing to the large proportion of individuals of studious and sedentary habits, it may be more prevalent among males than in other places." The attacks he refers to were brought on by "prolonged mental work, protracted mental excitement, or any intense strain on the feelings." That the attack may come on during actual work, and be arrested by suspending mental application, we have ample evidence to prove. It is, however, true that, if there is actual mental excitement, "the attack may not be developed during the paroxysm, but afterwards, when the excitement has passed off, and the mental strain is somewhat lessened." He marks two stages, one of disordered sensation, including glimmering, spectral forms, and other signs of visual derangement, tingling in some portion of the body, as the arm or one side of the tongue, affections of hearing and (in-

volution of the motor centres) speech, and loss of power over the facial muscles; the other of headache and nausea, which so often occur with the sensorial disturbances, the chief symptoms being cold feet, restlessness, and the localized, more or less piercing pain felt in the head, especially (so far as our observation goes) over the left eyebrow. Dr. Latham's cases were generally marked by anaemia, a relaxed condition of the muscles and arteries; the pulse small and compressible, often slow, but accelerated on slight exertion; the general tone of the system, in short, being lowered. The headache he considers explained by the contraction of the cerebral vessels in the first instance, being followed by their dilatation; the vaso-motor nerves of the sympathetic being first excited, and then exhausted.

It must be understood, moreover, that it is not necessary to turn aside to the alimentary canal in order to explain the phenomena (*i. e.*, as arising from actual visceral derangement), since they can readily follow as consequences of cerebral exhaustion, and thus may be the subjective side of actual incoördinate disturbances occurring in the cortical perceptive centres.

Then again, Thought acts upon the secretory functions of the skin, kidneys, and the intestinal glands. Hence ideal diaphoretics, diuretics, and purgatives, exclusive of those which excite the peristaltic action of the intestines.

Orichton gives, on the authority of Pechlin, the case of a student who applied to him for advice for (*inter alia*) a troublesome collection of glairy mucus every morning. For this, the doctor says, "I ordered him fifteen grains of white vitriol, with a little cream of tartar, in order to extricate the *pituita* from his stomach. He followed my advice, but by a preposterous conceit persuaded himself that the powder was intended as a sweat; and accordingly after he had swallowed it, he covered himself all over with the bed-clothes and fell into a profuse perspiration. He then came to thank me and tell me that the powder had been attended with the desired success. I no sooner heard of a sweat than, full of wonder, I asked him if he had taken any other remedy than the one I ordered him. He assured me he had not, but that he thought the powder which I prescribed for him was to sweat him; which effect he therefore expected, and which had been effectually accomplished" (lxiii., II. 445). The above case would have been still more satisfactory as an instance of the influence of expecta-

tion, or, as it may perhaps be termed, expectant imagination, had the patient not covered himself all over with bed-clothes.

The influence of intense study, long continued, in causing diabetes will not be questioned. In one of the most rapid cases which have fallen under our notice, this was apparently the cause. Dr. Richardson refers to three cases "in which the first excretion of sugar and the profuse diuresis were sequential to severe mental strain," and observes that "they constitute a hopeless class; the danger sudden, the course rapid, the fatal end sure" (xxi., 1868).

In the *Medical Times and Gazette*, October 10, 1868, are given the results of an examination by Dr. Byasson of the renal secretion passed under the opposite conditions of repose and cerebral activity. They may be thus summarized:

1st. The exercise of Thought was followed by an increase in the amount of urine. The number 1157 represented the quantity in cubic centimetres on the days of repose; 1320 on those of cerebral activity.

2d. The amount of urea was augmented in a marked manner (indicating increased disintegration), there being about a drachm more on the day of cerebral work than on that of repose. Dr. Byasson does not doubt the contrast would be greater if complete repose had been secured. "The experiments were so arranged that a day devoted to brain-work sometimes succeeded a day of repose and sometimes a day of muscular work, and in each case there was a perfect concordance in the results."

3d. A slight but uniform increase in the amount of the phosphates and sulphates during mental activity. Anhydrous phosphoric acid is represented on the day of repose by 1.51, and on the day of active thought by 1.98.

4th. The density, the acidity, the uric acid, lime, magnesia and potash, were scarcely affected. Chlorine was less in amount.

Dr. Byasson says that he can tell by a single analysis of the urine whether a man has passed the day in repose, or active thought, or muscular action, supposing the diet to have been uniform, and the external conditions similar during three days so employed.

Changes in the chemical composition of other secretions are much more frequent in emotional than purely ideational states. Still, as Liebig says, "every conception, every mental affection is followed by changes in the chemical nature of the secreted fluids;

and every thought, every sensation, is accompanied by a change in the composition of the substance of the brain," which may lead to changes, however slight and transient, in the functional activity of glands.

Passing on to Nutrition, a few observations may be made upon the unquestionable influence excited by intellectual states. If nutrition only occurs when the vital force is more powerful than the opposing chemical forces, whatever in mental action lowers vitality will proportionately interfere with nutritive processes.

Intense mental application may be said to interfere with nutrition in one form or other. In determining, however, the general ill-effect of study upon the body, it is impossible accurately to disentangle its influence from that of loss of exercise, fresh air, etc. But that it interferes with nutrition in many instances cannot be doubted; sufficiently so to justify the oft-quoted line from Shakespeare respecting Cassius's lean and hungry look, "He thinks too much." Still it is rather the plotting thought—the studying the overthrow of inconvenient rivals—that is here referred to, which wears away the flesh, and which justifies the expression that "such men are dangerous." On the other hand, the removal of the means of study when the intellectual pursuits have become a habit, is detrimental to health. It is said of Petrarch that "his friend the Bishop of Cavaillon, fearing lest his too close devotion to study should wholly ruin his health, which was already much impaired, having procured of him the key of his library, immediately locked up his books and writing desks, saying to him, 'I interdict you from pen, ink, paper, and books, for the space of ten days.' Petrarch, though much pained in his feelings, nevertheless submitted to the mandate. The first day was passed by him in the most tedious manner; during the second he suffered under a constant headache, and on the third he became affected with fever. The bishop now taking pity on his condition, returned him his key, and thus restored him to his previous health" (xliii. p. 4).

Descuret devotes a chapter to the "Mania of Study," and cites Rousseau's exaggerated expression "The man who thinks is a depraved animal," which he paraphrases "The man who thinks too much depraves his constitution," and enumerates among the consequences of extreme mental exertion, gastritis, enteritis, hemorrhoids, cancer of the stomach or intestines, and chronic affections of the urinary organs—a still greater exaggeration.

Whatever may be the injurious influence of mental work, the age to which many eminent thinkers have attained shows, at least, that it is not inconsistent with longevity, although from disuse the muscular system may become wasted. We have collected from several sources the following ages, at death, of men who have exercised their intellectual powers beyond the average:

Aristotle lived to 63; Archimedes, 75; Bacon, 66; Boerhaave, 70; Blumenbach, 88; Brougham, 90; Bossuet, 77; Sir Edward Coke, 84; Carnéades ("so intemperate in his thirst for knowledge that he did not even give himself time to comb his head or pare his nails"), 90; Chaucer, 71; Adam Clarke, 70; Democritus, 109; Dryden, 69; Miss Edgeworth, 82; Euler, 76; Euripedes, 75; Fontanelle, 100; Franklin, 84; Dr. Fothergill, 68; Galileo, 78; Galen, 90; Gauss, 78; Handel, 65; Caroline Herschell, 98; Hippocrates, 99; Hume, 66; W. Hunter, 65; J. Hunter, 65; Dr. Johnson, 75; Kant, 80; Landor, 89; Leibnitz, 70; Locke, 73; Lagrange, 77; Laplace, 78; Milton, 66; Newton, 85; Dr. Olbers, 80; Pindar, 80; Plato, 80; Pythagoras, 90; Quintilian, 80; Reid, 87; Dugald Stewart, 75; Solon, 80; Sophocles, 90; Simonides, 89; Mrs. Somerville, 92; Thucydides, 80; Thales, 96; Wordsworth, 80; Xenophon, 90; Zeno, 98; Zimmermann, 67.

In some of the foregoing examples it must be remembered that, though life was prolonged, the organ of mind itself was completely worn out.

"With curious art, the brain, too finely wrought,
Preys on itself, and is destroyed by thought."

Madden, in his *Infirmities of Genius* (quoted by Dr. Sweetser), has endeavored to estimate the relative longevity of different classes of authors. The natural philosophers in his table are at the top, their age averaging 75. The poets are at the bottom, who average 57. Caspar gives the average age of clergymen at 65; merchants, 62; clerks, farmers, 61 each; military men, 59; lawyers, 58; artists, 57; medical men, 56. It is obvious that the element of which we are in search is only one of many in these various occupations. It might be expected that, as appears above, medical men would be shorter lived than clergymen, without reference to mere brain work; taking the deaths, however, of twenty-two distinguished members of the former profession in England, in 1870, their ages ranged between 75 and 76. As to

the natural philosophers (mainly mathematicians) and poets, whether or not statistics comprise a sufficient number of cases, it is highly probable that the greater longevity of the former is a fact. If Wordsworth is a marked exception, he is also exceptional in the character of his poetry. He was more philosophical than emotional. Everything goes to prove that purely intellectual pursuits influence the organic functions much less powerfully than pursuits involving the passions. It shows the necessity of distinguishing between different forms of mental manifestations, the much closer connection which some mental processes have with the bodily organs than others; the far greater tendency some have to interrupt and suspend their operation than others. Thus, it is obvious that Sir Isaac Newton's intense concentration of thought did not imperil the action of the heart, while John Hunter's intense indignation suspended its action. All forms of disease are indiscriminately laid at the door of study by Tissot, namely, gout, tumors, aneurisms, inflammations, scirrhuses, ulcers, dropsies, baldness, apoplexies, convulsions, etc.; but it would be altogether opposed to medical experience to assert that the chances of inflammation or aneurism, and apoplexy or convulsions arising from study are equal. An aortic aneurism or a dropsy is much more likely to result from passion or other sudden emotional action than from thought.

Under this division, reference should be made to the influence which we cannot doubt that mental states may, under favorable circumstances, exercise upon absorption. Professor Laycock has maintained "the possibility of a lymph deposit being absorbed from an opaque cornea by the daily direction of the Attention to the part for a prolonged period by means of mesmeric passes" (vii., Oct. 1851). If this be so, we have a fact, the principle contained in which forms a most important basis for the practical treatment of some diseases. It is in entire accordance with the physiological law laid down by Müller: "An idea that a structural defect will certainly be removed by a certain act increases the organic action of the part" (iii. p. 1396). The application of this law—one which we desire to bring out here in bold relief—belongs, however, to the Chapter on the treatment of disease by psychical agents.

In concluding the consideration of the Influence of the Intel-

lect upon the Body, it is important to have clearly in view that—

1. Intellectual States, the result of impressions made upon the senses from without, or consisting of purely ideal states, whether these be formed by recollective or creative Imagination (the simple remembrance of sensations excited by the outer world, or so combined as to construct new forms), cause Sensation, Motion, and important changes in the Organic Functions of the body.

2. These ideal states may be as vivid and operative as if actually induced by real objects acting directly upon the sensory nerves.

3. In the ideal states, the bodily changes correspond to the ideas present in the mind, and are themselves involuntary, illustrating the automatic action of the hemispheres upon the lower sensory, motor, and sympathetic centres.

4. The Muscular movements which express mental states (*gesture language*) correspond in great measure to those movements which arise from impressions from external stimuli on the peripheral expansion of sensory nerves. They are figurative, and hence verbal expressions also are applied in common to both; in the one case intended to be literal, in the other metaphoric. This analogous language, thus applied to ideal and actual states, may either be explained on the principle that the encephalic seats of both are identical, or that ideational changes always tend to pass downwards to the motor and sensory centres.

In fact the muscular movements which form the elements in the language of gesture are repetitions of former processes which have been evoked by external stimuli, such stimuli being of sufficient force to determine a purposive muscular action. In the case where a gesture is made, we believe that the overflow of energy passes from the cortical idealizing centres down along the lines of least resistance, *i.e.*, those which are stereotyped by former action.

5. In either mental state—the ideal and that excited by sensible objects—the Sensorium may be placed in exactly the same condition both as to kind and degree of change, the stimulus proceeding from within in the one case, and from without in the other, the mind in the former instance always referring the sensation to the peripheral end of the nerves.

PART II.

THE EMOTIONS.

CHAPTER VI.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

I WISH to say a few words in regard to the sense in which the term emotion is here employed, though my object throughout these observations is to present *Illustrations* of the action of Mind upon Body, rather than to enter into the metaphysical questions which might be considered in connection therewith.

Every one is conscious of a difference between a purely intellectual operation of the mind and that state of feeling or sentiment which, also internal and mental, is equally removed from (though generally involving) a bodily sensation, whether of pleasure or pain, and which, from its occasional suffering, is often termed Passion, which likewise, because it moves our being to its very depths, now with delight, now with anguish, is expressively called Emotion—a true commotion of the mind, involving in its effects the body also,¹ thus subjectively rendering us conscious of the tumultuous mental movements which have arisen, and objectively manifesting to the outer world the signs of the disturbance within, the climax being the “mens emota,” or crazy

¹ Hence the not infrequent practice of speaking of *mental* emotion to distinguish it from bodily commotion. Indeed, a writer on the Passions (Dr. Colgan) goes so far as to say “Emotions are principally and primitively applicable to the sensible changes and visible effects which particular passions produce *upon the frame* in consequence of a particular agitation of mind.” It is never employed in this sense in the present work, in which Emotion is regarded as the state which causes these effects, and therefore as mental. It is very certain, however, that our notion of what constitutes an emotion is largely derived from its physical accompaniments.

distraction, of Latin writers. We can, then, easily recognize a condition which differs from any of those states of consciousness which, in reference to their influence on the bodily organs and tissues, we have been considering, differing also from the Will; and yet, as an idea may instantly excite emotion, and *vice versâ*, and as the emotions form motives which are rapidly followed by acts of Will, ideational, emotional, and volitional states are intimately bound together.

We sometimes apply the word Emotion to the simple (however special) state of mental pleasure or pain; at others to a compound state, which includes the idea in immediate relation with it. Thus a painful mental feeling may exist, and, until we know to what it refers, we can only term it an emotional state; but if we find it arises out of the apprehension of evil, we call it Fear, a specific emotion. We cannot, therefore, in considering the specific emotions, and passing beyond mere pleasure and pain of mind, get rid, if we would, of an ideational element; one which determines the character and direction of the purely emotional feeling which it generates. The term Emotion will be used both in its simple and compound signification, though it may occasionally be convenient to designate the former as Emotion *proper*. While, therefore, endeavoring to distinguish, so far as is practically useful, emotional and intellectual states of mind, they will be inevitably blended together, and under the head of Emotions, employed in a broad sense, we shall treat of those compound states¹ which, strictly speaking, include an ideational or intellectual, as well as an affective or emotional element.

"As every emotion involves the presentation or representation of objects and actions; and as the perceptions and, by implication, the recollections of objects and actions all imply cognitions, it follows that no emotion can be *absolutely* free from cognition" (x., i. p. 475).

When our desires are gratified, there results mental pleasure—Joy. When, on the contrary, they are disappointed, there arises mental pain—Grief or Sorrow. Such are emotions as regards

¹ The word Passion might be used to include the idea of a certain attainable gratification, and the emotion or feeling which is associated with it, while the word Emotion might be always rigidly restricted to the latter state; but as custom has rendered the passions and emotions synonymous, we shall probably avoid confusion by pursuing the course indicated in the text.

their quality, but they vary also in their quantitative character. Again, they may be manifested in very different degrees of intensity and force from the slight ripple to the resistless wave: and lastly, they may differ in their persistence. It is obvious that, as these characters vary, the influence of the emotion upon the body will be modified.

States of consciousness involving Emotion may be variously classified, but all classifications are more or less arbitrary, and we shall not pretend to give one which is either complete or reduces them to their simplest form; but the following grouping of the feelings will be found useful for our present purpose. Indefinite they must necessarily be. As Spencer says, "a thought, no matter how simple or how complex, contains more or less definable and namable elements, having connections that may be described with distinctness. But a sentiment is altogether vague in its outlines, and has a structure which continues indistinct even under the most patient introspection" (x., ii. p. 4). Those in the first division are antagonistic to those in the second; and, on the whole, the former involve pleasurable or elevating, and the latter painful or depressing, Emotion.

I.

1. **Joy**, and its various forms or synonyms, Contentment, Cheerfulness, Mirthfulness, and the intenser states of Rapture and Ecstasy.

2. **Hope**, which has been referred to in connection with the Imagination understood in its broad medical sense, expects—has *faith*—that a pleasurable event will happen, and is the opposite of Despair.

3. **Self-esteem**, Egoism, Self-complacency, Self-reliance, culminating in Pride or Conceit, and Vanity, is a selfish feeling,

II.

1. **Grief** or Sorrow, is, in its various stages and degrees, synonymous with Sadness, Affliction, Distress, Discontent, Melancholy.

2. **Despair**, the antithesis of Hope and Faith.

3. **Humility**, Modesty, Self-abasement, Remorse; the lowest and ignoble form—Cringing.

opposed to Modesty, Humility, and Cringing; assumes when allied with hatred of another, the form of Scorn, Contempt, Disdain, and Impudence.

4. **Courage**, Self-possession, or Confidence, implies energy; is the opposite of Fear and Cowardice.

4. **Fear**, and its acute or sudden form of Fright, and intenser form of Terror or Horror, with the minor ones of Faintheartedness, Anxiety, and Care, though the last may be regarded as gaining in chronicity what it loses in intensity. When epidemic, Fear assumes the Panic form. Allied to Suspicion.

Wonder and Astonishment or Surprise, when painful, may be classed with Fear.

5. **Calmness**, the opposite of Anger. Self-control implies that there is an emotion to repress.

5. **Anger** and its aggravated phases of Rage, Fury, Wrath, or what is commonly understood as Passion.

6. **Love** includes the love of the true, the beautiful, and the good, but is mainly applicable to the affection between human beings, in their various relations of mother and child, husband and wife, etc.

Admiration of another more than of self is the foundation of Veneration, Adoration, or Reverence.

Wonder or Astonishment, when pleasurable, is a form of Admiration.

6. **Hate**, the ignoble and more chronic form of Anger, leading to Revenge; the antithesis of Love.

7. Benevolence or Generosity is a form of Sympathy, Compassion, or Pity—a mixture of Love and Sadness. Involves “the endeavor to free that which we pity from suffering” (Spinoza). “Pity is akin to Love.” This is a mixed state which excites painful as well as pleasurable feeling.

7. Malevolence, Misanthropy, Avariciousness; the direct opposite of Benevolence or Generosity.

Of emotional states referred to in the succeeding illustrations, the most important will be those which arise in connection with GRIEF, DESPAIR, FEAR or FRIGHT, ANGER or RAGE; JOY, HOPE, PRIDE, and CONFIDENCE. Obviously some of the mental states enumerated in the foregoing classification are felt to be less emotional in their character than others; yet they can hardly operate without involving feeling of a certain kind, and they fall under the designation of Emotions understood in the broad and complex signification. They are Passions, in one of the many senses attached to the word; and although it is true they do not so markedly affect the body as anger, etc., they have, at any rate, outward physical signs which cannot be overlooked. When Bichat spoke of the Passions, he evidently had in view such emotions as anger and joy, which so remarkably influence the organic functions. His editor, M. Cerise, who places the strictly emotional element of the sentiments or passions in the sympathetic, and the ideal element in the brain, complains of Bichat's confusion of terms, and of his location of the whole instead of a part, of the passions in the visceral or ganglionic system. “All that Bichat says of the seat of the passions, ought to be restricted to the emotions” (li.).

These remarks on the definition of Emotion have insensibly led us into the anatomical and physiological questions which arise in connection with it; and without entering minutely into their consideration, we shall here pursue the subject a little further. Cerise, as we have said, believes that Emotion proper has its seat in organic life, while the desires, or sentiments, with which such emotion is associated, belong to the brain. According to his views, the solar plexus is the focus where, under the form of sen-

timental emotions, the various general conditions of the organism designated "thoughts" on the one part, and the impressions and effective ideas on the other, are really felt, or where, so to speak, their echo is heard. He does not pretend that it is easy to circumscribe it anatomically, since it is not composed of a special apparatus, but rather an indefinite one; so that the emotional echo which there takes place does not offer any very distinct character, if the *idea* of the cause or of the object of the emotion does not convey to it the precision which it lacks. He remarks that, although in most men the epigastric emotion is very obscure, it is sufficient to prove to us that it occurs in a ganglionic focus communicating with one or more sensory or motor nerves—an intermediate *appareil* between the general conditions of the organism and the brain; between, in other words, organic and animal life. All these conditions are, he considers, completely met by the *Solar plexus* of the sympathetic (li. pp. 306-7).

Whether we employ the term Emotion, however, in a broad or narrow sense, we must entirely decline to locate it in the sympathetic, and can only regard the sensation experienced at the epigastrium as one of the many *results* of emotional excitement hereafter to be considered.

Dismissing, then, as wholly untenable, the theory which would find a seat for the emotions in any of the sympathetic ganglia, or, in short, in any other region of the body than the encephalon,¹ let us consider to what portion of it they may probably be referred.

It is striking to observe how many cerebral physiologists have arrived at the conclusion that the emotions are connected in some special way with the medulla oblongata, or the adjoining encephalic ganglia; or employing the term Sensorium or sensorium commune in the old sense of Unzer, who included in it—besides the medulla spinalis—the medulla oblongata, the optic thalami, and pons Varolii, it may be said that to this region of the cerebro-spinal axis they have agreed in assigning a more direct connection with the emotions than to any other part of the nervous system. Thus Willis referred their seat to the pons Varolii; and Dr. Todd to "the posterior and superior part of the meso-cephale" in the following passages (c. p. 283): "Emotions are, for the

¹ The term Encephalon is always employed, in this work, in its comprehensive use of the contents of the skull; the term Cerebrum is restricted to the hemispheres.

most part, excited through the senses. . . . But emotions may likewise be produced by intellectual change. . . . Now, emotion may give rise to movements independent of the Will. The extraordinary influence of emotion on the countenance is well known, and this may affect one side of the face, which is paralyzed to the influence of the Will, or it may excite movements of the limbs, even when the Will can exert no control over them. From these facts it is plain that that part of the brain which is influenced by Emotion, must be so connected that the convolutions may affect it or be affected by it; that it may be readily acted on by the nerves of pure sense; that it may influence the spinal cord and the motor nerves of the face when the ordinary channels of voluntary action have been stopped. No part possesses these conditions so completely as the superior and posterior part of the meso-cephale, which we have already noticed as concerned in acts of sensation. Is an emotion excited by an impression made upon one of the senses? This part becomes directly affected, and through the optic thalamus, the emotional feeling causes intellectual change. The working of the intellect, on the other hand, may act on the seat of emotion through the same channel; and an excitement of this part produce movement of a limb, or of all the limbs, by its influence on the spinal cord through the olivary columns."

Brown-Séquard (1860, lviii. p. 226), referring to Dr. Todd's views, observes that he has given some good reasons in their support, adding, "I am ready to admit that the pons Varolii, particularly by its part connected with the roots of the auditive nerve, is a portion of the centre of emotional movements, but not the seat of the whole of this centre. The medulla oblongata, I think; is also a part of this centre."

Dr. Carpenter, writing in the October number of the *Brit. and For. Med. Rev.*, 1846, observed that "the occurrence of ideas in the cerebrum may produce feelings of pleasure or pain in the sensory ganglia analogous to those which are produced by sensations; that the tendency to the recurrence of a certain class of ideas constantly connected with feelings of pleasure or pain constitutes what is known as emotion, desire, or propensity; and that this is composite in its nature, involving the cerebrum for the formation of the ideas, and the sensory ganglia for the feelings with which they are associated." Essentially the same views are

expressed in his *Human Physiology*, 4th edit., 1853, and the author has ascertained that he continues to hold them, although he observes (in a letter dated Feb. 29, 1872) that "it is impossible to give any *definite* reasons why the thalami should be regarded as the special seat of the Emotions. We do not *know*, in the first place, that they are the seat of common sensation; but the evidence of Comparative Anatomy seems to me unmistakably to point to the distinctness between the Sensorial Tract and the Cerebrum; and the phenomena of Unconscious Cerebration indicate that cerebral changes are only brought to consciousness through their acting on the sensorium commune, through the 'nerves of the internal senses.' Now, the Sensorial Tract, or some part of it, would seem to be the seat of the emotive or affective states, which immediately link themselves on either to sensations or to ideas; the impressions that produce the former coming by the sensory nerves, the latter by the nerves of the internal senses; for they are often so closely connected with the sensorial state that it is difficult to separate the two. Further, it seems clear that the emotions of the lower animals bear no proportion to the development of the cerebrum."

Dr. Noble, of Manchester, in an able and suggestive book published in 1858 (lxv.), enunciated views to which attention has recently (1883) been directed by Prof. Cleland of Glasgow. When, according to Dr. Noble, the seat of emotional sensibility is acted upon from below by the nerves proceeding from the viscera and other parts of the body, there arise the buoyant or depressed feelings comprised under what is sometimes called the sixth sense of the Germans, *cænæsthesis*; when acted upon from above, Emotion; or to express these relations in Dr. Noble's own words communicated to the writer, "I regard emotional sensibility as a form of internal feeling, distinct from sensation proper, and also from thought, and the memory of thought. I look upon the corpora striata and optic thalami, intermediate between the convolutions and the ganglia of external sensation, as the site of this inner sensibility; when active spontaneously, it forms the *cænæsthesis*, the 'spirits;' when active under provocation from sensation, it is *propensity*; when active from thought, *Emotion*, sentiment, and so on." On this hypothesis as to the seat of emotional feeling, Mr Morell has written, "It would harmonize extremely well with the whole observed development of our knowledge, which, com-

mening with a physical impulse, appears next in the form of an incipient mental sensibility, and then expands into distinct notions or ideas, which ideas can then, in their turn, react upon the emotions. The position of the above-mentioned ganglia at the base of the hemispheres corresponds exactly with the supposed function" (op. cit., p. 129).

Professor Laycock, who located in the cerebral hemispheres the egotistic instincts and propensities, the sexual and domestic instincts and moral sentiments, and looked upon the cerebellum as the centre of vegetative life and of all the processes of the organic appetites and instincts, regarded the medulla oblongata "as at least the seat of the corporeal feeling of pleasure or pain." He thought it probable "that a series of changes takes place in the great encephalic centres, which end finally in the *medulla oblongata* before the higher feelings and sentiments can be experienced;" adapted movements, however, resulting from changes therein which are wholly independent of sensation or consciousness. "Being the seat of the substrata of all those corporeal actions—cries and facial movements, by which states of consciousness are manifested—these can be and are manifested automatically." After observing that those who are accustomed to associate consciousness with all adapted movements, cannot easily comprehend the automatic nature of the violent twitches of the face in infantile convulsions, and the automatic groaning often uttered during sleep, as if expressive of great pain, from the action of a morbid condition of blood or lung on the afferent nerves of the pneumogastric, and through it on the *medulla oblongata*, he adds, "there are phenomena, however, in favor of the doctrine that the *medulla oblongata* is the common sensory of all conscious states—whether they refer to corporeal processes or the purely encephalic changes associated with ideas. The cerebral and cerebellar hemispheres may be considered as extensive peripheries, having, like the corporeal periphery, the *medulla oblongata* for their centre. So that teleorganic changes taking place therein, which, in the usual states, coincide with conscious states—as ideas, feelings, or desires, may, during morbid states, pass downwards to the medulla oblongata, and there excite the activity of appropriate motor or kinetic substrata, without at the same time exciting any state of consciousness whatever. This is, in fact, what occurs in all cases of automatic or unconscious cerebral action. Possibly, it is in

the *locus niger* we must look for this common sensory"¹ (lv., ii. pp. 443, 461).

Dr. Kirkes, in his *Handbook* (1863), says: "It is not improbable that the sensory ganglia are the organs of those emotions and emotional acts or expressions which belong to the instincts which men and animals have in common—such as fear, anger, etc.—while through the hemispheres the mind manifests itself in its higher and peculiarly human emotions and feelings" (liii. pp. 469–70).

In his *Principles of Psychology* (x. p. 572), Mr. H. Spencer observes that "the medulla, being the seat of all feelings, whether aroused from without or from within, it naturally happens that its undue excitement, in whatever way caused, produces through the vagus nerves like effects on the viscera—it naturally happens that sensations intensely painful or pleasurable, and emotions intensely painful or pleasurable, alike cause fainting." (He adds that syncope may be caused even by intense intellectual action.) The reader acquainted with the writings of this psychologist needs not to be informed that he believes in the constant coöperation of all the leading nervous centres in every thought and emotion. Still, as respects the medulla oblongata, he regards it "as the seat of emotional feeling considered as a mental state apart from the movements to which it gives rise. Not, of course, that it *by itself* can generate Emotion, but that it is that out of which Emotion is evolved by the coördinating actions of the great centres above it. Sensations being the ultimate elements; ideas of them being but the partial excitations of the structures in which the sensations originally arose, and emotions being compounded out of the ideas of sensations (the composition being now mainly organic), it results that the centre in which all simple feelings or sensations are brought into relation remains to the last that in which they are localized, to whatever extent they are recombined by the actions of higher structures." (Extract from a letter to the author, March 2, 1872.)

I confess to rather a strong leaning to any physiology of the Emotions which recognizes a special and intimate *relationship* between them and the medulla oblongata, or some portion of

¹ "The vivisections of Brown-Séquard and Szokalski show that cries may be excited, independently of pain, by the reflex action of the *medulla oblongata*. They do not differ in their seat and origin from laughter," etc. (*loc. cit.*).

the sensory ganglia, one in accordance with the observation of Brown-Séquard that, while the various nervous centres which compose the base of the brain are the *conductors* of *voluntary* motor influence, they are the *centres* of *emotional* movements (xlvi., August 17, 1861). The importance of the medulla oblongata in this connection is borne out by the observations of Dr. Lockhart Clarke, who regards it as probable that the power of expressing emotions and desires is dependent upon the coördinating functions of the olivary bodies. (*On the Intimate Structure of the Brain*, lvi., 1868, p. 318.) Schroeder van der Kolk held the same opinion, and went further. He found that in beasts of prey these bodies are more highly developed than in herbivorous animals, the passions, especially anger, being accordingly much more strongly expressed in the faces of the carnivora than the herbivora. "The superior corpora olivaria appear to be organs for the involuntary or reflex expressions of the passions. . . . In birds, they seem to serve for the movements of the feathers in the head and neck in passion" (*On the Med. Ob.*, lvii. p. 204.) There is a wide distinction, however (though not necessarily a contradiction), between the above proposition of Lockhart Clarke, and holding that the medulla is the seat or organ of the emotions, in the sense in which Marshall Hall employs the term when he says: "Emotion, the passions, and the sense of pain have their seat in the medulla oblongata, and act not along the cerebral, but the true spinal and ganglionic nerves" (xvii. p. 22). There may be the close relationship between the emotions and the medulla, which the muscular coördination referred to by Dr. Clarke implies, and yet the seat of Emotion be elsewhere; in the optic thalami,¹ as suggested by Dr. Carpenter, or the meso-cephale, as held by Dr.

¹ The probability of these bodies being the seat of either common or emotional sensation is lessened if the opinion of Dr. Clarke be correct that they are parts of the central apparatus concerned in vision. He has shown, in the Proceedings of the Royal Society (vol. xi., 1861, p. 364), that the optic tracts or nerves are not only connected with the corpora quadrigemina, but a considerable division enters the optic thalamus, and spreads out among its cells. As remarked by Dr. Clarke in a letter to the author, it is certain that we have frequent hemorrhage and other morbid changes in these bodies without loss of Sensation, or any alteration in the state of the Emotions; and, further, that, although their size is in the direct ratio of that of the cerebral hemispheres, they are not so much smaller in the ox and sheep than in man as one would expect on the supposition of their being the emotional centres.

Todd, or in the cerebral hemispheres themselves, as, in fact, Dr. Clarke himself believes. Schroeder van der Kolk also regarded the hemispheres (posterior and middle lobes) as the seat of the emotions, and Dr. Maudsley observes: "The hemispherical cells are confessedly not sensitive to *pain*; still they have a sensibility of their own to ideas, and the sensibility which thus declares the manner of their affection is what we call emotional; and as there may be a hyperæsthesia or an anæsthesia of sense, so, also, there may be a hyperæsthesia or an anæsthesia of ideas. Certainly there do not appear to be satisfactory grounds, either in psychology or physiology, for supposing the nervous centres of emotion to be distinct from those of idea." "Emotion is strictly, perhaps, the sensibility of the supreme centres [hemispherical ganglia] to ideas" (lxiv. pp. 47, 137).

There is, no doubt, a source of error in the very simplicity of the exclusive view of the medulla oblongata being the seat of Emotion, since the whole nerve process which culminates in an emotional display varies so much in extent in one case, the disturbance affecting a simple reflex cycle in the medulla, and in others being evident as the result of a complicated action of the highest as well as the lowest centres. The hemispheres must be involved in any true and conscious emotion—in fact, an unconscious emotion is a contradiction in terms. Thus the emotion may in one case be an example of the purest reflex action (*e. g.*, a sudden start), or in another may present a gradual development in the higher centres, culminating in a discharge from the lower. Such an instance would be found in the case where an individual experiences either of the emotions after having listened to a speaker for some time, and reasoned on what he heard.

Although, however, it must be admitted that there are objections to the attempt to dis sever and separately localize the intellectual and the emotional elements of mental states in which they are combined, I cannot but think such a special relationship between the emotional element and the medulla must be admitted as shall explain why the passions act upon the muscles and upon the organic functions in a way universally felt to be different from that in which a purely intellectual process acts upon them. On the hypothesis which refers the intellectual and emotional elements equally to the hemispheres, or which does not at least recognize that the power of expressing emotions is de-

pendent upon the medulla oblongata, it seems to me more difficult to account physiologically for the popular belief of the feelings being located in the heart or breast, and for the sensations at the pit of the stomach; while the recognition, in some form or other, of an anatomical or physiological connection between the medulla oblongata and the emotions, brings the latter into close relation with the ganglionic cells of the pneumogastric, and with the alleged origin of the sympathetic or with its ganglionic centres.

With some difference of view, therefore, mainly on points of detail, there is a marked concurrence of opinion among modern physiologists as to the encephalic centre of emotional changes—those, at least, which involve movements—all referring it to one or other of the encephalic divisions of the old *sensorium commune*. We feel justified, then, in assuming that this region bears a special relation to the emotions.

CHAPTER VII.

INFLUENCE OF THE EMOTIONS UPON SENSATION.

Section I.—*Æsthesia*.

AN Emotion may excite ordinary Sensations (*æsthesia*), which, in addition, may be either excessive (*hyperæsthesia*), or diminished (*anæsthesia*), while it may also induce perverted sensations (*paræsthesia*), which when painful constitute *dysæsthesia*.

Passing, now, from the consideration of the general psychology and physiology of the Emotions, we proceed in the first place to examine the interesting series of phenomena resulting from the operation of their influence upon sensation. Ever tending to be confounded with the converse succession of events, the influence of morbid states of sensibility in producing emotional disorder, its consideration requires more discrimination than that of movements. We can scarcely avoid employing language which is not strictly scientific, and can be only understood in a popular sense. Indeed, with two elements so closely allied as the emotional and sensational—mental feeling and bodily feeling—it must constantly happen that in our terms, as in reality, we confound the two together, and in this blending fail to discover which is cause and which is effect, or speak of the consciousness of corporeal pleasure and pain as if it were not itself in one sense a mental state, although only referring to the condition of the body. We justly speak of some feelings as corporeal and of others as mental, although the former state involves consciousness as well as the latter; only it has reference to the condition of something external to mind, which impresses the extremities of the sensory nerves distributed upon and in the body. So with the special senses, while consciousness is implied, it has reference to the varying state of the bodily organs, the eye, the ear, etc., as impressed by external objects. It is, however, perfectly easy, in spite of metaphysical difficulties of this kind, to make clear what is meant by

the influence of a powerful emotion upon sensation, as a part of that influence of the mind upon the body which we are endeavoring, in this work, to point out and illustrate. For example, there can be no question as to the fact that moral disgust does in some instances cause the sensation of nausea, or that distress of mind may occasion neuralgia, or fright the sensation of cold, or that the senses may, under fear, be stimulated centrally, so as to cause subjective sensations, whether olfactory, visual, auditory, gustatory, or tactile. These facts remain of interest and importance, although the bare statement of them suggests some questions of difficulty. They are so, whether our physiology regards the functions of the hemispherical ganglia as comprising the sensational as well as the ideational elements of the passions—(see *ante*, p. 152)—or whether it relegates the former to the sensory ganglia. They are so, although not only do mental and physical sensations merge imperceptibly into each other—for we constantly witness the same results from emotional as from sensational excitement, physical and corporeal pain alike acting upon the body (as, *e. g.*, in quickening the circulation)—but mental sensations are so united with their associated ideas that it is difficult, and often impossible, to separate the purely emotional from the ideational elements of passion. It is a penalty which we pay for our classifications and divisions that, however convenient they are up to a certain point, they sometimes lead us to do violence to nature; to dis sever that which is inseparable, to sacrifice in the present case, it may be, the intimate cohesion of psychical states to the idol of reducing everything in science to orders and classes.

When we start with Emotion, in its bald sense, as our first element in the series of phenomena under review, we lose sight for the time of the mental conception which has determined the character of the emotion, and thereby determined, to a considerable extent, the character of the resulting physical changes. It would be idle, therefore, to pretend that we can rigidly carry out any such division as that of emotional and intellectual, desirable as we certainly hold it to be to have these states roughly in view in psycho-physical investigations. For however difficult it may be to free an Emotion from its intellectual accompaniment, we feel no hesitation in deciding that certain mental states are comparatively emotionless, while on the other hand there are mental states at once recognizable as essentially emotional, however much

they may involve conception. We have seen that a vivid idea, definitely directed to a certain locality, may, without generating any emotion, induce a sensation. We have adduced the experience of John Hunter. "I am confident," he said, "that I can fix my attention to any part until I have a sensation in that part;" words which ought to be inscribed in letters of gold over the entrance of a Hospital for the Cure of Disease by Psychopathy. Hunter's confident assertion is the more interesting, because, drawn from his own experience, it shows that the principle is not confined in its operation to the susceptible and nervous, but operates even on men of the highest mental endowments. And if calm, unimpassioned thought can thus affect sensation, how much more profoundly will an intense emotion, as Fear or Joy? "For securing attention to a limited subject, the feeling of Terror is highly efficacious" (Bain). In the next chapter we shall see the striking influence of Emotion on muscular movements, but in that influence we shall also witness its action upon sensation when the antecedent of motion. Thus the muscular action excited in vomiting is the result of the nausea we have just instanced, as a good illustration of a sensation induced by moral disgust. Subsequently, we shall study the phenomena which the emotional impulse causes in the body, perceptible by others, and in this sense objective; now, we consider those phenomena which are altogether subjective. In another sense, also, are they subjective, in that they are the result of impressions from within and not from without. While they are such states of feeling as have immediate reference to the bodily organs in their relation, ordinarily, to the external world, we approach them in a reverse order to the natural one. Disregarding the outer world and the impressions thence received by the sensory nerves, we place ourselves in the inner world of mental Emotion, and observe the influence which streams therefrom through the sensorium, inducing various sensations determined by a variety of causes.

Our starting-point, then, is this: Emotion may act upon the sensory ganglia and centres of the nerves of sensation, so as to produce any of those sensations which are ordinarily induced by impressions upon their periphery; such sensations, although central, being referred by the mind to the peripheral termination of the nerves.

It may be assumed, in accordance with recent doctrines in re-

gard to cortical perceptive centres, that they are also involved in the action of Emotion upon Sensation.

Besides, however, these direct and purely subjective sensations, sensation may be indirectly excited by changes in the neighborhood of the peripheral terminations of the sensory nerves, which changes are induced by Emotion, but not through the channels of the sensory nerves. Claude Bernard, indeed, holds that the same nerve may transmit the sensory current in both directions (xciii.), to and from the brain, but the sensations now referred to admit of a different explanation, being probably due to the influence exerted by the emotions upon the sympathetic nerves, as, for example, in the sensation of "creepiness" from fear, the local changes caused in the skin are impressed upon the sensory nerves at their peripheral terminations. Whenever the capillary circulation of a part is increased by emotional excitement, the sensibility is augmented, and the mind experiences sensations in the ordinary way, centripetally, although truly originating in an emotion.

And not only so, but persistent morbid feelings may act directly upon the character of the blood, and the blood thus changed may affect the sensory nerves, and produce innumerable subjective sensations. The influence of the emotions on the blood has yet to be considered; this granted, the action of dysæmia in causing dysæsthesia is clear. The circulation of the blood, also, as well as its composition, is so much affected by emotional impulses, that from this cause likewise arise altered sensations, whether exaggerated or deadened. In respect to the special senses, a flash of light or a voice may be perceived, as every one knows, as a merely subjective sensation, from central congestion, and this congestion may be caused by intense Emotion.

Striking proofs of the induction of bodily sensations by means of psychical agency, are to be daily found in the sensations produced by mental imagery of an emotional character. The sensations of a ball in the throat and that of throttling, so often caused by emotion and so familiar in cases of hysteria, may be referred to. By Romberg the *globus* is regarded as a direct subjective sensation, and not an indirect one occasioned by spasm of pharynx, which he does not believe to be present, for "liquids and solids pass equally well through the gullet." Sir W Scott said he did not know what other people feel, but wit

"the hysteric passion that impels tears is a terrible violence—a sort of throttling sensation." The *besoin de respirer* is a nearly allied state, due, in emotional cases, to subjective irritation of the respiratory centre.

There are, however, agreeable as well as disagreeable psychophysical phenomena. Here, as in hypochondriasis, it is very easy to put the cart before the horse; but no one doubts that while, on the one hand, a healthy glow of bodily health acts upon the mind and causes pleasurable emotion, joy, on the other hand, induces that general sense of bodily comfort, or well-being, to which the term *cænæsthesia* is often, though not quite correctly, applied, as it should include depressing as well as buoyant feeling.

Anxiety causes innumerable organic sensations. A man pictures himself in a position of responsibility; delivering an important speech, for instance, in the House of Commons. This is instantaneously succeeded by a "qualm in the stomach." I do not now mean actual queasiness or nausea, but the well-known indescribable sensation referred to the pit of the stomach—the "epigastric centre;" others experience, instead, an equally well-marked sensation in the legs, the perineum, or the palms of the hands.

Probably no sensation is more universally recognized as connected with Emotion than this instantaneous epigastric feeling, which may pass into a complete qualm in the sense of sickly faintness, or even into a qualm in the sense of its Saxon original—death. Milton speaks of "qualms of heart-sick agony," and the reader may be reminded of its physical correlative—the qualms of conscience. Again, I may either say I am qualmish from a moral cause, or, with Pistol, "I am qualmish at the smell of leek." The sensation in the pit of the stomach forms, no doubt, the main reason why the emotions, when not located in the heart, have been referred to the stomach by the vulgar, and to the solar plexus by some eminent physiologists. As popular opinion refers the seat of sensational impressions, not to the sensorium, but to the peripheral, or, as indeed they are often called, the sentient extremities of the sensory nerves, so does the same authority refer the emotions to the region of the stomach or breast; the reason being that mental feelings have excited the central nuclei of the nerves which supply these organs; the centre of the emotional movements being in the medulla oblongata (see p. 151). In regard to epigastric sensations, there has always been a ten-

dency to connect the deepest feelings of the soul with this region or the umbilicus. To this spot a monk in the eleventh century directs the thoughts to be turned in order to arrive at the highest degree of mental insight. "When thou art alone in thy cell," says he, "shut thy door, and seat thyself in a corner; raise thy mind above all things vain and transitory; recline thy beard and chin on thy breast; turn thy eyes and thoughts towards the middle of thy abdomen, and search the place of the heart, the seat of the soul. At first, all will be dark and comfortless; but if thou persevere day and night thou wilt feel an ineffable joy, and no sooner has the soul discovered the place of the heart, than it is involved in a mystic and ethereal light."¹

Shakespeare recognizes the influence of unhappy feelings on the sensations of the alimentary canal, in the passage in which Iago says:

"The thought whereof
Doth, like a poisonous mineral, gnaw my inwards."

Taylor says, in his *Early History of Mankind*, that at the Berlin Deaf and Dumb Institution they push the forefinger against the pit of the stomach to express "I;" that at the Edinburgh Institution they indicate their desire or will by placing the hand on the stomach, "in accordance with the natural and wide-spread theory that desire and passion are located there."

In accordance with the metaphoric use of words in this connection, it may be added that we speak of the *sickening* details of a crime, from the acknowledged influence it possesses in producing a state of nausea, which, if aggravated, would lead to actual vomiting. Sometimes our expressions are strictly figurative, at other times they pass insensibly into a description of the actual physical effect. The former is intended in such a phrase as—

"My spirit sickens at the hateful thought."
JOANNA BAILLIE'S "ETHWALD."

That hope deferred maketh the heart "*sick*," is a proverb as true as it is ancient. Thus Shakespeare—

"I feel such sharp dissension in my breast,
Such fierce alarms both of hope and fear,
As I am sick with working of my thoughts."

HEN. VI., ACT IV. SCENE V

¹ See Mosheim's Ecclesiastical History, and Gibbon, who, in quoting the passage characterizes the light as "the production of a distempered fancy, the creature of an empty stomach and an empty brain."

The effect produced upon the abdominal region by the emotions is recognized in the interchangeableness of the terms employed in all languages to signify the physical and the mental state. In the oldest historical work extant, we read that "Joseph made haste for his *bowels* did yearn upon his brother; and he sought where to weep." The Heb. רחמים is literally rendered in the authorized version; the association of the two ideas is therefore met with, as might be expected from its foundation in nature, in the language of the early, no less than in the later ages of the human race; popular language being largely justified by, though needing qualification from, the anatomical and physiological teaching of the present day. The Greeks made use of the same metaphor. In the above passage, for example, the word employed in the Septuagint¹ is ἐγκατα or (as in the Oxford MS.) σπλάγχνα, the intestines or bowels, the word which frequently occurs in the writings of St. Paul, as in the expression rendered by our translators "bowels of mercies" (σπλάγχνα οἰκτιρῶν) and "straitened in your own bowels." Hence by a curious interchange of ideas, along with verbal identity, the tenderest emotions are represented in the same language as that which is employed to describe the physical circumstances attending the death of Judas Iscariot.

From profane Greek authors similar examples might be cited, but the foregoing are sufficient to mark the connection which every one's consciousness and observation have in all ages recognized between the emotions and the alimentary canal.

Section II.—Hyperæsthesia.

It may here be noted, without detailing cases, that although anæsthesia is frequently found associated with insanity, there are cases in which hyperæsthesia is equally well marked.

One marked form of hyperæsthesia of emotional origin is seen in *hypochondriasis*, although in many cases the attention paid to the impressions is, in the first instance at least, excited by a morbid condition of some organ of the body.

We may, however, with Romberg, refuse to admit cases thus originating as properly hypochondriacal. "Hypochondriasis can only be said to exist if the mind creates new sensations, which

¹ The LXX. in Prov. xii., 10, render it by σπλάγχνα (bowels, i. e., tender mercies).

in their turn give rise to nutritive derangements. . . . The mind is productive, it creates corporeal sensations and changes; the imagination clings to its own productions and attaches itself to a given group of sensory nerves" (xxxiv., I. pp. 184-5).

Again, the special direction of thought to one part may cause anxiety, or anxiety may induce a person to direct his thoughts to the operations of the bodily functions. The course of phenomena in hypochondriasis is not so simple as at first sight appears. However, the fact undoubtedly remains that reflection, and especially the anxious reflection, upon any of the bodily sensations, increases them to a morbid extent, and may originate a host of imaginary disorders.

Section III.—Anæsthesia.

In cases of hysteria in which there is a loss of sensation, it is difficult to decide to what extent this condition can be fairly referred to the abnormal state of the Emotions, and frequently the invasion of the disorder is so gradual as not to be obviously connected with any special mental exciting cause; at the same time, the observations of many physicians would confirm the statement of M. Briquet, that "it is not rare to find it coming on quite suddenly after Emotion." He makes the observation, in regard to cases of hysterical anæsthesia (of 1240 of which he gives an analysis), that whatever may be the extent of the affection, whether of the whole of one side, or of the organs of sense, it only involves the parts supplied by the cerebro-spinal system, never those supplied by the sympathetic, as the intestines, lungs, etc. We are apt to lose sight of the reality and interest of cases of hysteria in general, by too summarily dismissing them as "hysterical," instead of learning a lesson from their etiology; as a German writer exclaims, "Woe unto him who swears allegiance to a word!"

Cases, in full, of hysterical anæsthesia may be seen in the *Gaz. des Hôp.* and *Annales Médico-Psychologiques*, 1855, p. 294.

Dr. Wilks (xlv., March 27, 1869) records the case of a girl to whom he was called, who had received a great fright. She had an hysterical attack, and fell into a state in which she appeared to have altogether lost the sense of touch.

In an article in the *Annales Médico-Physiologiques* (xxxv.) "On Diseases of the Cutaneous Sensibility among the Insane," M. Auzouy, of Maréville, states that, in that institution, of six hundred patients (including many demented, idiot, imbecile, and melancholy), he found more than half presented different degrees of cutaneous insensibility. He refers to the observations of M. Michéa, which prove the existence of anæsthesia in most affected with melancholia, especially among religious and suicidal lypemaniacs, and cites the case of an old man in the asylum at Dijon who received a serious wound which did not cause him any pain. The application of cupping-glasses and various irritants was not felt by him. This patient believed himself to have been dead forty years, and besought that he might be buried. By way of experiment, he was literally buried up to the neck, and the only thing he complained of was that his interment was not completed. The writer observes: "I believe I have sufficiently shown that insensibility to pain is a pathological state which constitutes not solely a fortuitous event peculiar to some cases of mental alienation, but rather a very frequent symptom, of which the appearance is intimately bound up with the generality of the types of insanity. This immunity from pain, independently of the alterations of which the sense of touch may itself be the object, is witnessed in various conditions, according to the form of delirium that it accompanies; it is, in general, *proportioned to the moral lesion*, increases or decreases with it, and influences powerfully the development and progress of the diseases incident to the insane" (ix., 1860, p. 68).

The *convulsionnaires* of St. Médard in 1731 serve as examples of anæsthesia. As numbers of these persons were thrown into this peculiar condition by causes known to be directly and purely mental, they admit of separation from cases of hysteria of vague or unknown origin, and may therefore be fairly employed as illustrations of the influence of emotional excitement upon the sensibility of the body. They were usually complicated with disorder of the motor system, especially a spasmodic condition of the muscles.

The work of Carré de Montgeron, *La Verité des Miracles*, contains the most astonishing recitals of the blows to which the convulsionnaires were subjected at their own desire, without pain, and, according to this author, without any visible effect.

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Calmeil, however, observes that "many of these fanatics deceived themselves greatly in imagining themselves to be invulnerable, for there has been, scores of times, undeniable proof given that many amongst them showed, after the cruel infliction of blows which they solicited, large patches of discoloration under the skin, and innumerable contusions on the surface, which had borne the most severe assaults" (ci., ii. p. 386).

In the case of the *convulsionnaire* Nisette, "She was struck on the head with a log, then with four logs, and then had the four members pulled in different directions. . . . At length, two men stood on her body; then one man stood on her back; two others dragged up her arms, and gave her the *strapado*. They pulled her arms and legs, one person being on her stomach; they suspended her by the feet; then balanced her by the arms and legs, a man being on her back; then they turned her round like a spit; then again dragged her by the four members, two persons also pulling from below the shoulders. This pulling continued for a long time, because there were only six persons to pull (!) After that, they again gave her the *strapado* and the ordinary *sape à la muraille*; then they trod her under foot, fifteen persons at a time" (op. cit., p. 370).

The insensibility to pain in these cases appears to have been complete. The slight extent to which the internal organs suffered seems to be best explained by the extreme rigidity of the muscles, which was a marked feature of the phenomena—a rigidity so frequently produced with great ease by hypnotic manipulations.

The distraction of the attention from impressions made upon the sensory nerves, whether painful or pleasurable, when the mind is under the influence of powerful Emotions, notoriously interferes with or entirely prevents the mind's perception of them: this principle forms the foundation of a large class of cases of psychical anæsthesia. Rapt in ecstasy, the devotee feels neither cold nor wounds. In those cases of hypnotism in which anæsthesia, but not complete sleep, is induced, the immunity from pain arises from the occupation of the thoughts or ideas in another direction. Of course, in those cases in which there is profound slumber, the insensibility is not due to the same principle, although the sleep may have been originally produced by mental influences. Mr. Braid found that if a patient *expected*

an operation, his suggestions and his endeavor to absorb the mind in another subject were apt to prove unsuccessful. This, however, does not necessarily involve emotional excitement, though it is, no doubt, often present.

The battle-field constantly affords examples of the influence of an engrossing emotion in blunting sensation. In reporting the battle of Monte Rotundo (1867), a spectator writes in the *Cornhill Magazine*: "All day long the battle raged; the troops were fainting with hunger and fatigue. Certainly they were the liveliest, most patient set of sufferers I ever saw; *the certainty of victory chloroformed their pain.*"

A striking case of anæsthesia caused by emotional excitement is recorded by Professor Ball (ciii., No. 1, 1881, p. 16). The patient had fallen into a passion with his mother-in-law. There was left hemi-anæsthesia, and no blood appeared when the skin was transfixed with a pin. The sense of temperature was also absent on the same side; so of the sensibility of the mucous membranes. Tickling the left nostril failed to induce sneezing, which was immediately caused by tickling the right; the tongue was insensible on the left side, as well as the mucous membrane of the left cheek and pharynx. A distinct median line separated the sensitive from the anæsthetic half of the body. Smell and taste were suppressed, and sight weakened on the left side. The deafness, however, was complete on both sides.

Section IV.—Paræsthesia.

The sensations of heat and cold are notably caused by emotional disturbance.

"I have a faint cold fear thrills through my veins,
That almost freezes up the heat of life."

ROMEO AND JULIET, ACT IV. SC. 3.

The commission appointed by the King of France, in 1784, to report to the Academy of Sciences on the claims of Animal Magnetism, reported, among other phenomena they observed, that without touching "the subject" or employing any means whatever, he experienced pain and very great warmth (*une chaleur très grande*), simply from expectation.

It is clear that Fear may not only cause the subjective sensation of cold, but may also reduce the temperature by its action upon the vaso-motor nerves.

Instances occur daily of cold extremities from painful emotions; warmth being soon restored, if Hope or Joy be substituted for "cold Fear."

The influence of Shame on the external ear, as well as the cheek, is proverbial. The expression "a burning shame" is not a mere figure, but involves and has its origin in the actual sensation of heat—

"Mine ears that to your wanton talk attended,
Do burn themselves for having so offended."

VENUS AND ADONIS.

Erasmus Darwin relates the following. Although the exposure to the cold of a frosty night had, no doubt, considerable influence in causing a chill in the first instance, the power of Fear in sustaining the morbid and purely subjective sensation of cold afterwards, cannot be denied.

"A young farmer in Warwickshire, finding his hedges broken and the sticks carried away during a frosty season, determined to watch for the thief. He lay many cold hours under a haystack, and at length an old woman, like a witch in a play, approached, and began to pull up the hedge: he waited till she had tied up her bottle of sticks, and was carrying them off, that he might convict her of the theft, and then springing from his concealment he seized his prey with violent threats. After some altercation, in which her load was left upon the ground, she kneeled upon the bottle of sticks, and raising her arms to heaven beneath the bright moon, then at the full, spoke to the farmer, already shivering with cold, '*Heaven grant that thou never mayest know again the blessing to be warm.*' He complained of cold all the next day, and wore an upper coat, and in a few days another, and in a fortnight took to his bed, always saying nothing made him warm; he covered himself with very many blankets, and had a sieve over his face as he lay; and from this one insane idea he kept his bed above twenty years, for fear of the cold air, till at length he died" (lxxv., ii. p. 359).¹

¹ Upon this case Wordsworth founded his poem, "Goody Blake and Harry Gill a true story."

The observation is made by Dr. Rush, that soldiers favored by the fortune of war remain comparatively insensible to cold. During the American War the Philadelphia Militia, accustomed to the comforts of city life, slept after the battle of Trenton in tents and barns, or in the open air, in the coldest months of the year; yet in the course of six weeks only two were ill, and there was but one death. Dr. Rush says he can only account for the healthiness of so large a number of men under such circumstances by the vigor infused into the human body by the victory of Trenton having produced insensibility to all the usual remote causes of disease.¹

No one will doubt that the sensations of *hunger* and *thirst* are modified—aroused or dulled—by the condition of the mind. A child hears water mentioned and experiences a desire to drink in consequence. With the drunkard, the mental image of a glass of spirits will excite his peculiar thirst for drink. Persons are often thirsty when, as every one knows, if the attention be diverted, the sensation disappears. But apart from these examples of the influence of ideas—the imagination—there are cases in which emotional excitement tends to create thirst. Thus, it has been observed at the commencement of an engagement. Dr. Rush, in his essay on the *Influence of the American Revolution upon the Human Body*, says he noticed thirst to be a very common sensation among both the officers and soldiers. He adds that it occurred when no exercise or action of the body could have excited it (lxi., i. p. 128). This is the more striking, because the circumstance of the mind being concentrated upon another subject failed to extinguish this sensation.

The influence of Emotion in causing hunger is curiously illustrated by the following:

A bookseller lately informed me as a singular circumstance that a pecuniary loss exerted an extraordinary effect upon his appetite. A gentleman had bought a large number of books, and sent a check for them. On presenting it to the bank the bookseller found that it was worth so much waste paper. The loss was very considerable and of course occasioned much disappointment and vexation. It was succeeded, however, by an un-

¹ Some of these examples belong equally to the influence of the mind on the walls of bloodvessels, and under the head of "involuntary muscles" we shall refer to the researches of Lombard again.

usual craving for food. He sent out for some beefsteak and ate one of the heartiest meals that he had ever done in his life. Moreover, from that time his loss caused him no concern. Dearly bought as the pleasure of his meal was, he seemed hardly to regret it.

Section V.—Dysæsthesia.

When illustrating the influence of emotional states upon vascularity, several examples will be given in which pain was present as one of the results. There are other cases in which the vascularity is either not marked or altogether secondary, and in which severe pain is the prominent and primary symptom; being the consequence of the fear of pain, or the witnessing the signs of pain in others.

During an *émeute*, some years ago, in Paris, a trivial event happened, and is related by Gratiolet (xv. p. 286), which is a good illustration of the effect produced upon sensation by psychical impressions. A company of soldiers and National Guards, engaged in the Rue Planche-Mibray, were exposed for a few moments to a murderous fire from all sides. One of the combatants received a slight contusion from a reflected ball upon the shoulder, and scarcely noticed it. After the skirmish, however, experiencing a momentary pain in the part which had been struck, and fancying in his fright he had received a more severe injury, he felt a stream of blood flowing down the side of his chest from the wound. "He distinctly felt it, yet the skin had not even been broken."

Gratiolet (loc. cit.) also mentions two medical students, engaged in dissection, one of whom playfully struck the other's extended finger with the back of his scalpel. Frightened, and imagining that he was cut, he uttered a terrible cry, and when he discovered his mistake averred that the pain was so acute, that he thought the instrument had penetrated to the bone.

One of my friends, on hearing of a relative's hand having been injured by a pistol-shot, felt an acute pain not far from the spot, and turned very pale.

Professor Bennett's case of a terrified butcher, who, on trying to hook up a heavy piece of meat, slipped, was suspended by the arm by the hook, and when taken to a chemist, said he suffered

acute agony, is well known. The hook had only traversed his coat, the arm was uninjured, and yet through fear he cried out with "excessive pain" when the sleeve was cut off in order to allow of the arm being examined.

An excellent example of the influence of emotional excitement in the form of a fearful belief, in causing a corresponding sensation, is given by Dr. Noble (lxv. p. 120) on the authority of Dr. Whitehead:

"Mons. Boutibonne, a man of literary attainments, a native of Paris, served in Napoleon's army, and was present at a number of engagements during the early part of the present century. At the battle of Wagram, which resulted in a treaty of peace with Austria, in November, 1809, Mons. Boutibonne was actively engaged during the whole of the fray, which lasted, if I rightly remember, from soon after midday until dark. The ranks around him had been terribly thinned by the enemy's shot, so that his position at sunset was nearly isolated; and while in the act of reloading his musket, he was shot down by a cannon-ball. The impression produced upon his mind was that the ball had passed from left to right, through his legs below the knees, separating them from his thighs, as he suddenly sank down, shortened, as he believed, to the extent of about a foot in measurement, the trunk of the body falling backwards on the ground and the senses being completely paralyzed by the shock. In this posture he lay motionless during the remainder of the night, not daring to move a muscle for fear of fatal consequences. He experienced no severe suffering; but this immunity from pain he attributed to the stunning effect produced upon the brain and nervous system. 'My wounded companions,' said he, 'lay groaning in agony on every side, but I uttered not a word, nor ventured to move, lest the torn vessel should be roused into action and produce fatal hemorrhage, for I had been made acquainted with the fact that the bloodvessels, wounded in this way, did not usually bleed profusely until reaction took place. At early dawn, on the following morning, I was aroused from a troubled slumber by one of the ical staff, who came round to succor the wounded. 'What's matter with you, my good fellow?' (*Qu'a-t-il, mon camarade!*) he. 'Ah! touchez-moi doucement, je vous prie,' I replied, '*Un de canon m'a emporté les jambes.*' He proceeded at once to mine my legs and thighs, and giving me a good shake, with a

ris de joie he exclaimed, '*Faites-vous lever d'abord, vous n'avez rien de mal.*' Whereupon I sprang up in utter astonishment, and stood firmly on the legs which I believed had been lost to me for ever. I felt more thankful than I had ever done in the whole course of my life before. I had not a wound about me. I had, indeed, been shot down by an immense cannon-ball, but instead of passing through my legs, as I firmly believed it to have done, the ball had passed under my feet, and had ploughed away a cavity in the earth beneath, at least a foot in depth, into which my feet suddenly sank, giving me the idea that I had been thus shattered by the separation of my legs. *Voilà ce que se fait-il le pouvoir d'imagination.*' "

Section VI.—Special Senses.

The influence of Emotion in exciting the sense of sight is illustrated by many ghost stories, visions, etc. The expression of Coleridge, in regard to this class of phenomena, is a happy one. "The imagination, under (emotional) excitement, generates and produces a form of its own." The state of the feelings at the time will determine the character of phantasms, whether fearful or agreeable. Those who believe in real visitations from the other world, and have any knowledge of physiology, do not deny that there are subjective as well as objective ghosts.

All this is true as fact—whether we hold that the sensory centres are called into activity every time we recall to the mind the localities which we have visited, or the sounds we have heard, in accordance with the position taken by Bain and others, that a sensation, and a remembrance of a sensation, involve the same portion of the brain—or whether we believe that the mere recollection of an object is a purely ideational act,¹ involving only those portions of the cerebral cortex which are not in direct communication with the special sense organs, while nothing short of the presence of distinct hallucinations or illusions of the senses, as ocular spectra, implies the activity of the sensory perceptive centres.

Are the organs of sense—the distal extremities of the sensory nerves—themselves affected by emotional excitement? In other

¹ See p. 83 of this work.

words, is such central hyperæsthesia transmitted to the peripheral terminations of the nerves? The remarks already made on the Influence of the Intellect upon Sensation (Chapter II.) apply here also, *mutatis mutandis*. It is obvious that our present standpoint does not necessarily extend beyond the central terminations of the sensory nerves. It is sufficient that we allow that these can be excited by an emotional impulse, to account for all the subjective sensorial phenomena which follow, without supposing any centrifugal change to take place in the course of these nerves or in their peripheral expansions.

We know that a man who labors under amaurosis can still behold spectra; that if he is deaf, he can still hear an audible voice; or can smell, though his olfactory nerve is destroyed; and, therefore, it cannot be needful to suppose any centrifugal action along the course of the nerves of sense. This remains a secure position to take, even if it be true that this backward action—retransmission—can occur.¹ No physiologist has gone further than Müller in maintaining that it can and does; in fact, I venture to think that, while admitting that the internal parts of the apparatus of vision are alone essential to the production of certain phenomena, he confounds two views which are distinct—the one, that sensorial phenomena of subjective origin are as truly states of sensation as those excited objectively; the other, that, in the former case, there is usually a current along the nerve from centre to periphery. He is right when he says that phantasms and visions are not to be confounded with mere ideas; but when he says that they are seated “in the senses,” and that the idea in the sensorium excites the active state of particles in the retina, it would be clearer to substitute the expression that the idea in the cerebral hemispheres excites the action of the sensorium and the central terminations of the sensory nerves, so as to produce the same effect as if excited by a peripheral impression.

¹ That accomplished physician, the late Dr. Symonds, observes—“I do not see any impossibility in such a transmission, when the impression is unnaturally vivified; and it appears, indeed, somewhat probable, from the well-known fact that those parts of the nervous system which have been used to be associated in their action, are ever ready to sympathize; and thus, when a certain part of the brain immediately concerned in the recalled impression is, from some cause or other, excited, and which, from its connection, had often been excited at the same time with a spot on the retina, the latter becomes likewise affected. But though we admit the probability of such consenting action, what has been already said is, I trust, sufficient to show that the reproduction of the sensation takes place independently” (xxvi. p. 244).

With regard to a question sometimes asked—are the subjective sensorial phenomena or sensations which arise from an internal stimulus like an emotion, as real as those excited by an external object?—it is obvious that as sensation, and the consciousness of an impression made upon the nerves, are the same thing, and as this function is seated in the sensory centres, and not the periphery of the nerve, it is as truly a sensation, whether the sensorium is reached from within or from without; whether acted upon from above or below. The individual who thinks he sees an object, which is not present to excite the optic nerve, ought to be told—not that he is wrong in saying he is conscious of the sensation experienced, but in supposing that that sensation consists of the consciousness of an impression produced upon the peripheral termination of the nerve by an external object.

In the majority of cases of false sensations of mental origin, expectant attention appears to be the chief element in the causation, and we have had occasion to refer to several interesting cases in a previous section. In some, however, although a state of expectancy is also present, Fear itself has generated this expectant condition, and in illustration of this the two following cases may be mentioned. The first has reference to the sense of smell.

(a) OLFATORY.—When, during the reign of Charles I., the Parliament was at issue with the King, and there were rumors of dangerous plots, report was made to the House of one (without foundation) which was designed to blow up the members. During its reading some stood up alarmed, including “two very corpulent members,” whose weight broke a board in the gallery, which gave so great a crack, that some thought there was a plot indeed, and Sir John Ray cried out that he *smelt* gunpowder. The result was a panic in the House, and throughout London, followed by an armed band marching to Westminster to defend the House from this imaginary gunpowder plot!

(b) OCULAR.—The effect of alarm and imagination in health upon the sense of sight, as well as upon feeling, is exceedingly well illustrated by the following account given by Mr. Braid:

“Two captains of merchant vessels arrived in port at the same time, and both went to take up their quarters in their usual lodgings. They were informed by the landlady of the house, however, that she was very sorry that she could not accommodate them on that occasion, as the only bedroom which she could have

appropriated for their use was occupied by the corpse of a gentleman just deceased. Being most anxious to remain in their accustomed lodgings, almost on any terms, rather than go elsewhere, they offered to sleep in the room wherein the dead body was laid out. To this the landlady readily gave her assent, considering it better, so far as *she* was concerned, to have three such customers in her room than only one, and he a dead one. Having repaired to bed, one of the gentlemen, who was a very great wag, began a conversation with the other by asking him if he had ever before slept in a room with a corpse in it, to which he replied, "No." "Then," said the other, "are you aware of the remarkable circumstance that always, in such cases, after midnight, the room gets filled with canaries, which fly about and sing in the most beautiful manner?" His companion expressed his surprise at this. But no sooner said than realized; for, the candle having been put out, presently there was a burst of music, as if the room really was full of canaries, which were not only *heard*, but at length the horrified novice in the chamber of death avowed that he both *saw* and *felt* the birds flying in all directions and plunging against him. In a short time he became so excited that, without taking time to do his toilet, he rushed downstairs in his night-dress, assuring the astonished household of the fact, and insisting that the room really was *quite full of birds*, as he could testify from the evidence of his senses, for he had not only *heard* them, but also *seen* and *felt* them *flapping their wings against him*" (xx. p. 88). The captain had some excuse for saying he *heard* them, although not for seeing or feeling them, for his companion had really imitated the note of the canary by blowing through a reed dipped in water.

Pettigrew cites from Dr. Reid "the case of a woman who was almost blinded by fright, in witnessing a paroxysm of epilepsy with which her husband was affected in the night. In one eye the vision was completely destroyed; in the other the capacity of seeing was intermittent, 'going and coming,' as she herself described it, 'like the sun when a cloud passes over it'" (lxxvi. p. 101).

(c) AUDITORY.—In the following case, deafness was caused by fright. It is given by Sir Astley Cooper and quoted by Pettigrew: "A child ten years of age, who wanted to write her exercise and to scrape her slate-pencil, went into the school in the dark to

fetch her knife, when one of her schoolfellows burst from behind the door to frighten her. She was much terrified, and her head ached. On the following day she became deaf, and on the next, so much so as not to hear the loudest talking. Sir Astley saw her three months after this had happened, and she continued in this deplorable state of deafness" (lxxvi. p. 99).

Mr. Dalby informs me that he has had several remarkable cases of deafness from mental causes fall under his notice. He made the following reference to them in his Address as President of the Section for "Diseases of the Ear," at the International Congress, in 1881.

- * "I have known the hearing in apparently healthy subjects to be almost completely lost on the witnessing a sudden death of a near relative; on several occasions, immediately upon the receipt of news of a painful nature; in the case of women, upon the fright produced by a cry of fire or an alarm of burglars in the house; at the witnessing of the terrible sight of a man cutting his throat; once on the receipt of great good fortune which had not been anticipated. On each of these occasions the hearing power of the patient was always perfectly good up to the time of the catastrophe, and immediately afterwards the deafness was intense, so that the change in all probability was almost instantaneous." Mr. Dalby suggests that there was a sudden hyperæmia in some portion of the brain, or perhaps in the medulla at the origin of the auditory nerve (xciv., iii. p. 340).

I am not aware that there is any proof of hyperæmia. Rather would it seem likely that there is a sudden molecular change in the nervous tissue, destroying for a time the continuity in the course of the auditory track. Or if the change be vascular, it seems more probable there is capillary spasm. It is difficult, however, to see why it should persist so long, a difficulty which also applies to the theory of hyperæmia. Whatever the solution may be, it does not explain satisfactorily why, when the shock passes through the optic nerve, the organ of hearing suffers.

Prof. Ball, of Paris, holds the view that localized spasm or cramp of the vessels—cerebral ischæmia—is the true explanation, and he records the following case.

In May, 1879, C. D—, æt. 26, was in good health when he had a quarrel with his mother-in-law and fell into a violent passion. Trembling with emotion he went home, intending to relate to his

wife what had passed, but to his astonishment he found that he was deaf, and moreover he could not speak. Frightened at his condition, he wrote on a piece of paper the name and address of a doctor, showing the clearness of his mind. The next day, at four o'clock in the afternoon, he suddenly recovered the power of speech. He remained, however, completely deaf in both ears. He also labored under left hemi-anæsthesia (see under "anæsthesia"). The senses of *smell* and *taste* were abolished on the same side; that of *sight* weakened. There was a slight degree of left facial paralysis, and the left arm was weak. The tongue deviated to the left side.

The application of galvanism removed the affection. The tactile sensibility first increased, and on the fourth application the patient heard a loud cracking in the right ear, as if something had burst in his head, and hearing was instantly restored. At the same instant sensibility fully returned and he was quite well.

It remains to add that a year afterwards the patient had a return of the symptoms without any emotional cause, and was relieved by the same treatment. Two months subsequently, a violent emotion caused a relapse, and he was for the third time deaf and dumb, and anæsthetic on the left side. He was again treated and relieved by galvanism (ciii., No. 1, 1881).

(d) GUSTATORY.—See the above illustration of the influence of the emotions on the sense of taste. Hysterical cases of hemi-anæsthesia, in which this sense is involved, may also be referred to.

(e) TACTILE (see *Æsthesia*).

In concluding this chapter, we may briefly state the principles which lie at the foundation of the influence of the Emotions upon sensation, exciting, as stated at the commencement, ordinary sensations, excessive and morbid sensations, or suspending them altogether.

1. Thought strongly directed to any part tends to increase its vascularity, and consequently its sensibility. Associated with a powerful emotion, these effects are more strikingly shown. And, when not directed to any special part, an excited emotional condition induces a general sensitiveness to impressions—an intolerance of noise, for example, or cutaneous irritation.

2. Thought strongly directed away from any part, especially when this is occasioned by Emotion, lessens its sensibility. As

the activity of the cerebral functions during deep intellectual operations excludes consciousness of the impressions made upon the sensory nerves generally, so an absorbing emotion effectually produces the same result.

3. The emotions may cause sensations, either by directly exciting the sensory centres and the central extremities of the nerves of sensation, or by inducing vascular changes in a certain part of the body, which excite the sensitive nerves at their peripheral terminations.

4. There is no sensation, whether general or special, excited by agents acting upon the body from without, which cannot be excited also from within by emotional states affecting the sensory centres; such sensation being referred by the mind to the point at which the nerve terminates in the body.

CHAPTER VIII.

INFLUENCE OF THE EMOTIONS UPON THE VOLUNTARY MUSCLES.

THE Emotions, by their action on the neuro-muscular system, may cause—

- I. Coördinate contraction and relaxation: Movements.
- II. Irregular and excessive contraction: Spasms and Convulsions.
- III. Loss of power: paralysis.

Section I.—Muscular Contraction and Relaxation.

The ordinary influence of Emotion upon the muscles is most marked upon those of the face—"the Dyall of the affections"—and as we shall find it convenient to include the muscles engaged in respiration in the consideration of the action of the emotions on the voluntary muscles, it must be added that they are strikingly influenced by emotional changes; less, but sufficiently distinctive, is the effect produced upon the limbs, especially the hand. The question—To what extent the influence of the mind on the facial muscles is direct, or through the heart and lungs, will be referred to subsequently. As Expression depends on the contraction and relaxation of the muscles, the relation between Emotion and muscle becomes of great interest and importance in a physiognomical point of view, including in this all the fleeting expressions, gestures, and attitudes to which the passions of the soul subject the body. The predominance of one emotion, or of emotions of one class, may cause, however, more than evanescent expressions—may determine the settled character of the features, and is the basis of physiognomy as distinguished from mere pathognomy—emotions of a noble and lofty character tending to produce a refined, and those of a sensual character, a debased

type of expression, which may become not only permanent in the individual, but hereditary.

As Scott describes Bertram's features, in *Rokeby*—

“For evil passions cherish'd long
Had plough'd them with impressions strong.”

On the contrary, as Ruskin says, “there is not any virtue, the exercise of which, even momentarily, will not impress a new fairness upon the features, neither on them only, but the whole body.”

Let us consider now the most striking and familiar effects of strong emotion upon muscular contraction and relaxation.

Joy excites the whole muscular system, producing, when excessive, laughter, rapid motions of the limbs, dancing, running, leaping, throwing the arms about, and clapping or rubbing the hands. When moderate, the mouth relaxes into a smile from contraction of the zygomatic, involving with it the smile of the eyes from action of the orbicularis palpebrarum. The levator labii raises the upper lip and shows the teeth. The broad grin of Joy contrasts with that of Hate. The effects of Joy, as contrasted with those of Grief, were well exhibited in the Barnsley Colliery Explosion of 1866, when, after a period of suspense, two men reached the top in safety—one of them having volunteered to seek for any that were still living, and succeeded in bringing the other in safety. “They were nearly pulled to pieces by the delighted engineers, who seized them, shook hands with them, stripped them, scrubbed and congratulated them till they were almost overdone.”

The brightness of the eye in joy is due to several causes; one would appear to be the action of the ocular and possibly the orbicular muscles in rendering the eyeballs tense.

The signs of Joy may closely border upon those of Fear, because the mind pictures to itself the possible prevention or removal of the sources of its joy—

“Vix sum apud me, ita animus commotus est metu
Spe, gaudio, mirando hoc tanto, tam repentino bono.”
ANDRIA, ACT V. SC. iv. l. 34-5.

Here Terence, in representing Pamphilus as laboring under mixed and contending feelings, recognizes the psychological fact that Fear and Joy are simultaneously caused by glad tidings.

The nostrils are dilated, the angle of the mouth, the eyelids, and the eyebrows are raised by pleasurable, and depressed by painful feelings. The activity of the vocal muscles is excited by Joy, giving a characteristic tone to the voice, but it may be too rapid to allow of intelligible articulation—

“*With hurried voice and eager look,
‘Fear not,’ he said, ‘my Isabel!
What said I—Edith!—all is well—
Nay, fear not—I will well provide
The safety of my lovely bride—
My bride?’ but there the accents clung
In tremor to his faltering tongue.*”

LORD OF THE ISLES, CANTO II. xix.

Still further embarrassment is caused by increased frequency of swallowing.

The muscles directly engaged in respiration are excited, and indirectly induce changes which more properly belong to the organic functions.

In explaining the action of Joy on the muscles, Darwin observes, “with animals of all kinds the acquirement of almost all their pleasures, with the exception of those of warmth and rest, are associated, and have long been associated with active movements, as in the hunting or search after food, and in their courtship; moreover, the mere exertion of the muscles after long rest or confinement is in itself a pleasure, as we ourselves feel, and as we see in the play of young animals. Therefore, on this latter principle alone, we might, perhaps, expect that vivid pleasure would be apt to show itself conversely in muscular movements” (xcv. p. 77).

Of the sounds produced during the laughter of Joy, Darwin observes, “we can see in a vague manner how the utterance of sounds of some kind would naturally become associated with a pleasurable state of mind; for throughout a large part of the animal kingdom, vocal or instrumental sounds are employed either as a call or as a charm by one sex for the other. They are also employed as the means for a joyful meeting between the parents and their offspring, and between the attached members of the same social community. But why the sounds which man utters when he is pleased have the peculiar reiterated character of laughter we do not know. . . . This is an equally obscure

point why the corners of the mouth are retracted and the upper lip raised during ordinary laughter" (xcv. p. 207).

Grief.—In the early stage of Grief, acute pain induces wringing of the hands, grinding the teeth, tearing the hair, sobbing and groaning. Its influence on the power of speech, when extreme, is well described by Capulet in "Romeo and Juliet"—

"Death, that bath ta'en her hence to make me wail,
Ties up my tongue, and will not let me speak."

Yet not less true is the description of hopelessness, in its chronic form, by Collins in his Ode to the Passions.

"With woful measures, wan despair,
Low sullen sounds, his grief beguil'd;
A solemn, strange, and mingled air,
'Twas sad by fits, by starts 'twas wild."

While hope—

"——— with eyes so fair:
Enchanted smil'd, and wav'd her golden hair."

In a later stage Grief induces feeble respiratory movements and sighing, and produces on all the muscles very different effects from Joy. They are, in fact, the natural result of pain which has been felt to such a degree as to exhaust the system; the flaccid muscles now droop under their own weight, those of the cheek especially tending to produce by their action on the eyelids the familiar expression of sadness.

The antagonism, in Grief, to the orbicularis palpebrarum, corrugator supercilii, and pyramidalis nasi, indicated by the obliquity of the eyebrows, has led Darwin to propose an ingenious explanation, after being, he says, sorely puzzled to discover one. One sunny day he met a girl whose eyebrows as she looked up at him became very oblique, and the forehead furrowed. On returning home he made three of his children gaze at the top of a tall tree standing against an extremely bright sky. The above-mentioned grief muscles were energetically contracted to protect the eyes from glare. In still trying to look upwards a struggle occurred between them and the frontalis muscle, especially between its central fasciæ and the pyramidalis nasi. The effect was precisely the same as witnessed in grief or anxiety. Children contract the grief muscles when they scream, for the purpose of,

in the first instance, compressing their eyes and so protecting them from being gorged with blood, and afterwards from habit. "I therefore," says Darwin, "expected to find with children, that when they endeavored either to prevent a crying-fit from coming on, or to stop crying, they would check the contraction of the above-named muscles, in the same manner as when looking upwards at a bright light; and consequently that the central fasciæ of the frontal muscle would often be brought into play." Mr. Darwin observed children under such circumstances, and found this to be the case. He met, for instance, a little girl who had been frightened by a dog, and when he inquired the cause, "she stopped whimpering, and her eyebrows instantly became oblique to an extraordinary degree. Here, then, as I cannot doubt, we have the key to the problem, why the central fasciæ of the frontal muscle and the muscles round the eyes contract in opposition to each other under the influence of grief, whether their contraction be prolonged, as with the melancholic insane, or momentary from some trifling cause of distress. We have all of us as infants contracted our orbicular, corrugator, and pyramidal muscles, in order to protect our eyes whilst screaming; our progenitors before us have done the same during many generations; and though with advancing years we easily prevent, when feeling distressed, the utterance of screams, we cannot, from long habit, always prevent a slight contraction of the above-named muscles; nor indeed, do we observe their contraction in ourselves, or attempt to stop it if slight. But the pyramidal muscles seem to be less under the command of the Will than the other related muscles; and if they be well developed, their contraction can be checked only by the antagonistic contraction of the central fasciæ of the frontal muscle. The result which necessarily follows, if these fasciæ contract energetically, is the oblique drawing up of the eyebrows, the puckering of their inner ends, and the formation of rectangular furrows on the middle of the forehead. . . . In all cases of distress, whether great or small, our brains tend, through long habit, to send an order to certain muscles to contract, as if we were still infants on the point of screaming out; but this order we, by the wondrous power of the Will, and through habit, are able partially to counteract, although this is effected unconsciously, as far as the means of counteraction are concerned" (xev. p. 193).

As already observed when speaking of Joy, the angles of the mouth are depressed in Grief, by the action of the depressores anguli oris. The explanation is referred by Darwin to the same general principle as the obliquity of the eyebrows. Children when they scream not only contract the orbicular muscles and so draw up the lip, but, in order to keep the mouth open, the depressors of the angles of the mouth act strongly. In grief or low spirits the same will happen, for "as the depressors have been repeatedly brought into strong action during infancy in many generations, nerve-force will tend to flow, on the principle of long associated habit, to these muscles as well as to various other facial muscles, whenever in after-life even a slight feeling of distress is experienced. But as the depressors are somewhat less under the control of the Will than most of the other muscles, we might expect that they would often slightly contract whilst the others remained passive. . . . The above actions (including a slight suffusion of tears) may be considered as rudimental vestiges of the screaming fits, which are so frequent and prolonged during infancy" (xev. p. 197).

Contrast the mild facial expression and crouching attitude of **Humility** with the firm and decisive tread of **Pride**, the head erect or thrown back, the mouth firm and compressed, or displaying a characteristic smile—"Pride smiling stern," as Beattie expresses it.

"The lip of Pride, the eye of flame,
The full-drawn lip that upward curl'd,
The eye that seem'd to scorn the world."

ROKEBY, CANTO I. viii.

Familiar and striking are the characters Pride takes when it amounts to contempt, or scorn, disdain, sneering, and defiance. Darwin, who points out that they can hardly be distinguished, although they may be expressed in different ways, refers to the slight uncovering of the canine tooth on one side (*levator labii superioris alæque nasi*) which may occur and which passes into a derisive laugh or a sneering smile; and also to the feature insisted upon by Duchenne, the partial closing of the eyes, or averting them, or turning the whole body away, the signification of which is clear, namely, that an individual is too contemptible to be taken any notice of. Disgust, a closely allied feeling, is indicated by signs of revulsion, especially about the mouth and in the

action of the hands. Expulsive movements of various kinds are observed, as spitting, and protruding the tongue, which is proverbially insulting. The Abyssinians, the Australians, the Malays of Malacca, the Fuegians, and negroes, are all known on the testimony of travellers to manifest their contempt by spitting (xcv. p. 261). The exposure of the canine tooth, referred to as occasionally seen in sneering, has been worked out by Darwin in a very interesting manner. "I have seen it exhibited," he says, "with perfect distinctness by a lady who was being quizzed by another person. It was described by Parsons (*Transact. Philosoph. Soc., App.* 1746, p. 65) as long ago as 1746, with an engraving showing the uncovered canine on one side. Mr. Rylander, without my having made any illusion to the subject, asked me whether I had ever noticed this expression, as he had been much struck by it. He has photographed for me a lady who sometimes unintentionally displays the canine on one side, and who can do so voluntarily with unusual distinctness. . . . The action is the same as that of a snarling dog; and a dog when pretending to fight often draws up the lip on one side alone, namely that facing his antagonist. Our word *sneer* is in fact the same as *snarl*, which was originally *snar*, the *l* "being merely an element implying continuance of action." (Wedgewood.) I suspect that we see a trace of this same expression in what is called a derisive or sardonic smile. The lips are then kept joined, or almost joined, but one corner of the mouth is retracted on the side towards the derided person, and this drawing back of the corner is part of a true sneer" (xcv. p. 251).

A man may express his sovereign contempt of a person who asks a favor of him, by a shrug of the shoulders. He affects to be unable to do anything. To an Englishman the motion is an irritating one, but on the Continent it would seem generally to imply no more than helplessness, or a negation, as when you ask a man to explain any circumstance and he indicates that he cannot do so by shrugging the shoulders. It is difficult to see why the muscles which cause this action should be called "the patience muscles." Darwin says, "this gesture implies an unintentional or unavoidable action on our part, or one that we cannot perform; or an action performed by another person which we cannot prevent." It accompanies such speeches as "it was not my fault;" "it is impossible for me to grant this favor;" "he

must follow his own course; I cannot stop him;" and Darwin might have added, "I don't care," a phrase indicative of the mental attitude which leads us to refer to it under Contempt.

"The attitude of the proud courser, magnificently caparisoned, or of the cock that has just vanquished his enemy, coincides with the attitude of the proud man, so far as the relation of the form of these animals to that of man permits it. In each case, the head is high, the movement grave and measured" (Gall, xxii. iv.).

With this, Gall contrasts the expression of **Vanity**: "Observe in his cage either a canary bird or a goldfinch; while you address him in a kind tone, you will see him turn from side to side, and answer you in affectionate accents expressive of his pleasure." "One of my bitches is never happier than when she is carrying my slippers in her mouth. Charmed with this honorable burden, she bridles up, and wriggles her whole body, and the more I exclaim 'Fine Stella, fine Stella!' the more animated are her movements, and she passes from one to another to obtain a tribute of admiration. She might have been likened to a country damsel, in a new gown on her way to church, wriggling to and fro, with head up, neck stiff, and chest protruded, to draw upon herself the envious looks of her companions. This same bitch, that had always been very lively and fawning, became suddenly afflicted with a sullen sadness, and in spite of all I could do to enliven her, she continued lying in her corner. After two years of melancholy, she suddenly resumed her former gayety, and began to caress me with her ordinary liveliness and affection. In the course of the same day, I learned that a squirrel, which I had had in the house for two years, had been killed. Never was unquiet, vain, and jealous courtier more deeply wounded than was this poor brute by the presence of a strange animal" (xxii., iv. p. 190; v. p. 282).

The attitude of the man affected with **Vanity** is the opposite to that of **Pride**, although both are founded in selfish feeling. "*L'orgueilleux*," observes Descuret, "*s'élève; le vaniteux s'étale.*"

The characteristics of **Envy** or **Jealousy** are well described by the same author. "When misfortune happens to his rival, there is an infernal smile upon his thin lips; if fortune is his lot, his features immediately contract; his eyebrows meet; his eyes be-

come sunk in their sockets; his figure, already meagre,¹ seems to become stunted—in short, the envious man grows thin with the good fortune of another. If he hears read any production of remarkable merit, he is silent, but, while fancying that he conceals, he betrays himself nearly always to an acute observer by a slight clattering of the feet, as if he wished in some sort to avenge his vexation on the ground" (lxvi. p. 599).

It is from the same motive that men bite their lips with jealous vexation.

"But gnawing Gealosity, out of their sight,
Sitting alone, his bitter lips did bight."

THE FAERIE QUEENE.

Fear amounting to Terror, by causing spasmodic respiration, may, as in grief, choke the utterance, or the voice is husky. The facial expression is that of dyspnœa. In describing painful respiration, Gratiolet observes: "Ces mouvements ont pour cause immédiate les contractions de ce muscle peaussier du cou (*platysma myoides*²), dont la partie faciale a reçu de l'anatomiste Santorini le nom de muscle rieur, *risorius*, sans doute par antiphrase, car ce prétendu risorius est le muscle de la dyspnée mortelle, de l'angoisse et de l'épouvante" (xv.).

Darwin, who enters minutely into the cause of the action of the *platysma myoides* in contracting with the shiver of Fear, arrives at the conclusion that the first sensation of Fear or the imagination of something dreadful commonly excites a shudder. He caught himself, he says, giving a little involuntary shudder at a painful thought, and distinctly perceived that his *platysma* contracted. One of his sons, while getting out of bed, shuddered from the cold and felt this muscle contract. Mr. Darwin, therefore, concluded that "as it certainly often contracts during a shudder; and as a shudder or shiver often accompanies the first sensation of fear we have a clue to its action in the latter case" (xcv. p. 303).

In the accounts of the frightful colliery explosion at Barnsley, in 1866, the effects of fear and suspense are well portrayed. The cage was lowered into the pit in the hope of rescuing some of the sufferers. Then two men lay with their heads over the edge of the pit mouth, the spectators standing around and maintaining

¹ "Leanfaced" (Shakespeare).

² Muscle de frayeur of Duchenne (xcvi., *Album Légende*, xi.).

the most profound silence, life or death hanging on the result of the experiment. The *stillness of death* was preserved by the awe-struck occupants of the platform, as they *checked their breath* under the influence of their highly wrought feelings. Then the two men gave a loud shout, which was heard echoing and reëchoing within the shaft. All listened in *sickening suspense* for a response, but none came, and the shout was repeated with a like result.

In *Childe Harold* is well expressed the signs of this condition of mind :

"All heaven and earth are still, though not in sleep,
But *breathless* as we grow, when feeling most,
And *silent* as we stand in thoughts too deep."

Fear, if it does not proceed so far in the direction of terror as to paralyze the muscles, induces rapid muscular action in the form of flight, while it fixes and contracts other parts of the body in the instinctive attempt to conceal and, as it were, diminish their size. The man flying from pursuit with his head bent between his shoulders, has been justly compared to a dog with its tail between its legs, under similar circumstances. By acting chiefly on the flexor muscles, fear causes the general bending or curving of the frame—analagous to the action of the hedgehog, etc.—while courage contracts the extensors, and produces expansion and height.

"To have," says Mr. Spencer (x., i. p. 483), "in a slight degree such psychical states as accompany the reception of wounds, and are experienced during flight, is to be in a state of what we call Fear. . . . Fear, when strong, expresses itself in cries, in efforts to escape, in palpitations, in tremblings; and these are just the manifestations that go along with an actual suffering of the evil feared."

"He answered nought at all: but adding new
Feare to his amazement, staring wyde
With stony eyes and hartlesse hollow hew,
Astonisht stood, as one that had aspyde
Infernall furies with their chaines untyde.
Him yett againe, and yett againe, bespake
The gentle knight; who nought to him replyde;
But trembling every joynt, did inly quake,
And foltring tongue at last these words seemed forth to shake."

THE FAERIE QUEENE.

The muscular states alike of contraction (or tension) and relaxation, find illustration in the emotion of **Terror**, for with the signs

of the former already mentioned, and "the stare of the eye," are combined the relaxation of the masseters, the sphincters, and the processes of organic life with which we are not now concerned.¹

Beattie has accurately described the muscular action and appearance of the eyes in one form of fear—**Suspicion**:

"Suspicion hides her head,
Nor dares th' obliquely gleaming eyeball raise."

The attitude of the muscles in **Courage**, firm and resisting, and prepared for defence, with a bold facial expression, contrasts with the well-recognized outward signs of Fear.

The influence of the conflicting mental conditions of courage, or, perhaps, rather defiance, and of fear, was well represented recently at the execution of Hinson, at Newgate. I abbreviate the description given by the *Daily Telegraph*: "A tall, muscular, and somewhat defiant-looking man, *advanced with quick, firm tread* up the steps of the scaffold. He was determined to meet his fate, if possible, unflinchingly. He exclaimed, 'Now for the grand secret!' and when he reached the drop, he looked with assumed nonchalance on the iron chain depending from the cross-beam above him, and then down at his feet, with which he appeared almost to stamp upon the drop. His whole aspect for a moment was that of a man who held in supreme contempt the fall that was before him, and was as ready to die as he would have been to live, had the opportunity of a renewed period of existence been afforded him. But as Calcraft, who had followed the culprit to the drop, proceeding with his hideous preparations, drew the white cap over the condemned man's face, every particle of courage seemed to forsake him; his *whole frame quivered with fear* as the noose was adjusted round his neck; and the chaplain, speaking the last words of spiritual exhortation left him to meet his doom. Some resistance on the part of the culprit had been anticipated, and from his demeanor when he first left the room where he was pinioned, probably not without reason. But, as previously stated, his whole bearing was altered in a moment when the full reality of his awful position was realized, and if the

¹ See a good description of the physical aspect of Terror and of other emotions in Bain's *Emotion and the Will*.

services of the two warders who stood behind him had been required, it would have been to support and not to control him."

Calmness—a placid condition of the feelings generally—is marked by a gentle contraction of the muscles, indicative of repose, but at the same time of latent power—by a countenance free from furrows, but not relaxed by weakness.

Rage or Anger contracts the masseters, inflates the nostrils, expands the chest, furrows the forehead, and exposes and rolls the eyeballs, clenches the fist, and induces a violent action and more or less rigidity of the muscles generally; it usually impels the body forward, while Fear impels it backward. The zygomatic muscles and levatores labii contract, and expose the teeth.

I one day saw two cabmen quarrelling in the street, one violently gesticulating while the countenance of the other (and older man) was completely controlled, and he held his hands behind him. On placing myself in a position where I could see them, I found they were in vigorous action. The overflow of nerve-force found vent there while the man commanded his features in order, as he supposed, to conceal his anger.

Darwin attributes the most striking signs of Rage to a *direct* action of the excited sensorium. But he observes that animals and their progenitors have, when attacked, fought and defended themselves, which they would not have done unless enraged. The muscular action thus associated with rage is inherited. Further, various organs will be affected by rage in nearly the same way as by bodily suffering. The heart, according to him, is affected in a direct manner, probably also by habit; voluntary exertion increases its action; nerve-force readily flows through accustomed channels, and thus although there may not be any muscular action whatever, the effect of the emotion of rage will be to increase the flow of nervous force to this organ, and the Will cannot control it if it would (xcv. p. 75).

"The destructive passion is shown," observes Spencer, "in a general tension of the muscular system, in gnashing of teeth and protrusion of the claws, in dilated eyes and nostrils, in growls; and these are weak forms of the actions that accompany the killing of prey. Everyone can testify that the psychical state called Anger consists of mental representations of the actions and impressions which would occur while inflicting some kind of pain" (x. p. 483).

The description of Earl Doorm, who "took his russet beard between his teeth" in his anger, admirably represents the symbolic acts of this passion, as well as the accompanying rapid movements—

"At this he turned all red, and paced his hall;
Now gnaw'd his under, now his upper lip."

Indignation.—This state and Anger differ, as Darwin observes, only in degree from Rage. "The respiration is a little hurried; and as all the muscles serving for this function act in association, the wings of the nostril are somewhat raised to allow of a free indraught of air, and this is a highly characteristic sign of indignation. The mouth is commonly compressed, and there is almost always a frown on the brow, instead of the frantic gestures of extreme rage. An indignant man unconsciously throws himself into an attitude ready for attacking or striking his enemy, whom he will perhaps scan from head to foot in defiance. He carries his head erect, with his chest well expanded, and the feet planted on the ground. He holds his arms in various positions, with one or both elbows squared or with the arms rigidly suspended by his sides. With Europeans the fists are commonly clenched" (xev. pp. 246-7).

Love and **Hate** present their opposite characteristics no less clearly; the general effect of the former on the body being to possess, retain, and embrace the object upon which it expends itself; the attitude of the mother pressing the child to her breast being in unison with the leading feeling. The smile of Hate may be opposed to that of Love, for we may witness, especially when a person thinks he is able to succeed in a nefarious scheme,

"The ghastly smile of fell Malignity."

Contrast again the expression of **Adoration**, a compound of love, wonder, and fear, with that of **Revenge**; taking, on the one hand, the exquisite description of Una—

"With folded hands, and knees full lowly bent,
All night she watcht."

Or Wordsworth's lines:

"Quiet as a nun,
Breathless with adoration."

And on the other, Collins's stanza :

"——— but, with a frown,
 Revenge impatient rose :
 He threw his blood-stain'd sword in thunder down,
 And, with a withering look,
 The war-denouncing trumpet took,
 And blew a blast so loud and dread,
 Were ne'er prophetic sounds so full of woe ;
 And ever and anon he beat
 The doubling drum with furious heat.
 And though sometimes, each dreary pause between,
 Dejected Pity at his side
 Her soul-subduing voice applied,
 Yet still he kept his wild unalter'd mien,
 While each strain'd ball of sight seem'd bursting from his head."

From these examples, it is sufficiently clear that certain feelings of the mind act upon certain muscles of the body in preference to others. Taking those of the eyebrow alone, it is not an affair of chance that one state of mind induces contraction of the orbicularis palpebrarum and the pyramidalis nasi, and thereby a lowering expression; another (joy or inquisitiveness) contraction of the frontal muscle, and consequently an arched eyebrow; and a third (agony or painful thinking) contraction of the corrugator supercilii.¹ The fixed relationship between certain muscles and certain mental states is also proved, conversely, by the effects produced in evoking the latter, by placing the former in particular attitudes. This can be done to some extent in an ordinary condition of the system, but can only be thoroughly effected in artificial somnambulism or Braidism.

To determine the exact relation between particular emotions and particular muscles, there are three methods available. The first is to observe the contraction of the muscles under the influence of well-recognized emotions, whether in the sane or insane; the second, to call up distinct feelings when the peculiar condition of the nervous system, known as artificial somnambulism, has been induced, and then to note the action of the muscles; the third, to galvanize the muscles separately and observe the mental expression produced.

The opinions universally held in regard to the expression of the emotions are based on the first method; when we speak of universal opinion, however, we are aware how considerable is its

¹ See these various expressions illustrated in the plates of Bell's *Anatomy of Expression*.

divergence in regard to the significance of certain expressions. This is remarkably shown by asking different persons to give their opinion as to the meaning of certain facial expressions. Still a substantial unanimity obtains. The observation of the insane is a fruitful source of knowledge, and I have during the last ten years obtained a large number of photographs from various institutions, more especially the Cambridge Asylum, Earlswood, Essex Hall, and Bethlem Hospital. I am particularly indebted to Dr. Savage for a valuable series of photographs of patients, taken at the last-mentioned asylum. I have, of course, availed myself of the opportunity of observing the expressions of patients themselves in a variety of mental states, and this in many instances is more trustworthy than photographs, because the attention of the patient is in the latter often arrested and diverted into a fresh channel of thought.

It is in artificial somnambulism that I have witnessed the most beautiful expressions. The effects produced on the muscles are, under these conditions, more reliable perhaps, than under any other, for the subject's mind is so absorbed in the one idea or feeling evoked, that the muscular contractions are of the most definite and striking character.

The last method referred to is that carried out with so much skill and perseverance by Duchenne (de Boulogne). It must not be forgotten that it is open to one objection from which the preceding is free. For the expressional significance of the contraction of a particular muscle must be interpreted. And this interpretation must depend upon the judgment already formed of the expression of the emotions. What Duchenne's method serves to show is the function of each facial muscle in producing or assisting to produce a certain emotional expression, the meaning of which is acknowledged by mankind. Duchenne also induced persons to call their facial muscles into action by trying to throw themselves into certain mental states and comparing the results with the converse method of galvanizing the muscles. The influence of the emotions on the muscles of the face is shown in the following table, the results arrived at by Duchenne appearing to me to be essentially in accordance with those reached by the other methods of investigation.

.	Moderate contraction of the zygomaticus major and the orbicularis palpebrarum (inferior portion).
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False joy; fictitious smile.	Zygomaticus major only.
Agreeable reflection . . .	Orbicularis palpebrarum (superior portion) and Zygomaticus major.
Laughter	Zygomaticus major and orbicularis palpebrarum.
Laughter (ironical) . . .	Buccinator. Depressor labii inferioris (quadratus menti).
Grief. Despair	Depressor anguli oris (triangularis). The corrugator supercilii (<i>the grief muscle par excellence</i>).
Dejection	Depressor anguli oris. Triangularis (compressor) nasi. Inferior rectus (causing downward gaze).
Sad reflection	Orbicularis palpebrarum (superior portion). Depressor anguli oris (triangularis).
Great grief (with weeping)	Corrugator supercilii. Zygomaticus minor.
Fear	Frontal portion of occipito-frontalis and platysma myoides.
Fright	Extreme contraction of frontalis and platysma myoides.
Fright (with torture) . .	Corrugator supercilii. Platysma myoides, and depressors of lower jaw.
Anger (concentrated) . .	Orbicularis palpebrarum (superior portion); Masseters; Buccinator; depressor labii inferioris; platysma myoides.
Anger (ferocious). Rage .	Pyramidalis nasi; platysma myoides; depressors of the lower jaw, in an extreme degree.
Contempt	Palpebral muscles; depressor labii inferioris; compressor naris; levator labii superioris <i>alæque</i> nasi. Occipito-frontalis (frontal portion); depressors of lower jaw.
Doubt	Levator labii inferioris; eccentric fibres of the orbicularis labii, either of its lower half or both halves at once; the frontal.

Ecstasy	Zygomaticus major; rectus superior and obliquus superior.
Surprise. Astonishment	Occipito-frontalis (frontal portion). Depressors of lower jaw. Stronger contraction in astonishment.

(Non-emotional.)

Attention	Occipito-frontalis (frontal portion).
Reflection	Moderate contraction of the orbicularis palpebrarum (superior portion)
Meditation	Strong contraction of ditto.

In violent Passion, the dilators of the nostril come into play; and in some forms of Fury, the masseters.

We have referred to the significant character of the movements of the hand. A very remarkable writer of the 17th century, **John Bulwer**, was the author of a book entitled *Chirologia; or the Natural Language of the Hand! Composed of the Speaking Motions and Discoursing Gestures thereof*, etc., the motto being "*Manis membrum hominis loquacissimum*." In it he observes that this member, which he quaintly terms "the manual Text of utterance," takes "oftentimes the thoughts from the forestalled tongue, making a more quick dispatch by gesture; so when the fancy hath over wrought the Hand, our conceptions are display'd and utter'd in the very movement of a thought. For the gesture of the hand many times gives a hint of our intention, and speaks out a good part of our meaning, before our words, which accompany or follow it, can put themselves into a vocal posture to be understood. And as in the report of a Piece, the eye being the nimbler sense discernes the discharge before any intelligence by conduct of the vocall wave arrive at the Eare, although the flash and report are twins born at the instant of the Pieces going off, so although Speech and Gesture are conceived together in the minde, yet the Hand first appearing in the delivery, anticipates the tongue, in so much as many times the tongue, perceiving herself forestall'd, spares itself a labour, to prevent a needless tautologie." The remarks on gestures in general are admirable. "The lineaments of the body doe disclose the disposition and inclination of the minde in generall; but the motions doe not only so, but doe further disclose the present humor and state of minde and will, for as the tongue speaketh to the eare, so

Gesture speaketh to the eye, and therefore a number of such persons whose eyes doe dwell upon the faces and fashions of men, do well know the advantage of this observation, as being most part of their ability; neither can it bee denied but that it is a great discoverer of dissimulation and great direction of businesse. For, after one manner almost we clappe our hands in joy, wring them in sorrow, advance them in prayer and admiration; shake our head in disdaine, wrinkle our forehead in dislike, crispe our nose in anger, blush in shame, and so for the most part of the most subtile motions" (civ.).

Bulwer, in his work, *Philocophus; or, the Deafe and Dumble Man's Friend*, unfolds "the subtile art which may enable one with an observant *Eie*, to *heare* what any man speaks by the movement of his lips,"¹ and designates *Gesture* the *Vox Corporis*—the only speech and general language of human nature. "What though," he says, "you cannot expresse your mindes in those verball contrivances of man's invention; yet you want not speech, who have your *whole body* for a Tongue, having a language more naturall and significant, which is common to you with us, to wit: *Gesture*, the general and universall language of Human Nature, which, when we would have our speech to have life and efficacy, wee joyne in commission with our wordes, and when wee would speak with most state and gravity, we renounce words and use *Nods* and other naturall signes alone" (cv., *Introduction*).

We may undoubtedly grant to Bulwer what, he says, is all he asks to be allowed—"to have bin the first that by Art endeavored to linke the Muscles and the Affections together in a new *Pathomyogamia*; or at least to have published the Banes between *Myologus* and *Pathology*, that any Physiologicall Handfaster that can marry them stronger together might doe it if he pleas'd" (cvi., *Introduction*).

Taking a general view of the opposite conditions of the muscles—contraction and relaxation—it may be observed that the absence of all painful and pleasurable emotions—a state of apathy—may be accompanied by motionless features and relaxed limbs; but perhaps the simplest and most satisfactory illustration of Emotion producing relaxation of the voluntary muscles is found in moderately pleasurable states of the mind. The whole body is in a lan-

¹ A very early reference to lip-language, now so much employed in the education of deaf-mutes.

guid and relaxed condition, and naturally assumes the recumbent posture; the eyelids droop, and the lips slightly open. If the emotion intensifies into active Joy, smiling and laughter succeed, in which the fibres of the orbicularis oris are relaxed. We have, however, no longer simple relaxation, but decided contraction also, the antagonistic muscles of the orbicularis—the zygomatici—being called into active exercise. Relaxation, again, we have seen exemplified in the later stages of Grief, in which it results from the exhaustion of pain and despair. In weeping, in which there appears to be a relaxation of the muscular fibres surrounding and controlling the mouth, the effort is really due to the powerful contraction of the muscles of the cheek, and especially of the triangularis oris.

Contraction, it has been said, is the natural language of the painful emotions, relaxation of the pleasurable ones, and it is true that in the early stage of Grief we witness violent contractions of some of the muscles. In Anger, again, the muscles are vigorously contracted; but there are many exceptions to the rule as thus laid down. It would be more correct to say that the pleasurable or joyous emotions impart *expansion* to the *expression*; the painful or sorrowful ones, *concentration*. Some confusion has arisen from the use of the word “contraction” as applied sometimes to the muscles, and sometimes to the expression. Joy, Hope, Benevolence, contract the muscles; so do Grief, Fear, Avarice; but the former mainly contract the extensors, and the latter the flexors, and the result in the first case is expansion. However, we shall subsequently see more clearly how far, and in what sense, it is true that there exists a relation between contraction and painful emotion on the one hand, and relaxation and pleasurable emotion on the other.

What principle determines these outward manifestations?

The discussion of this question has been to some extent anticipated, as the origin of certain facial movements has been suggested in enumerating them.

We must commence with the recognition of the fundamental principle which governs purely corporeal actions, before we can trace the guiding principle of emotional movements.

Prochaska did this under the term *Lex Nostræ conservatio* so prominently brought into notice as a grand teleological law by Professor Laycock, and by Bain as the law of self-conservation. By tue of it, in unconscious states, certain movements take place

to ensure the preservation of the individual. In conscious states the working of this law is mainly secured by feeling—by the sensations of pleasure and pain.

The emotional movements are no less guided by the same principle, and they employ the same machinery when outwardly expressed.

Some of these movements, however, are obviously directly designed to secure, in accordance with the law of Conservation, the object suggested by a certain emotion, while others have no such direct object, but occur by virtue of a law of Correspondence, to which we are about to refer. The former may be called primary; the latter, secondary or figurative.

Under the influence of Fear, or a sense of danger, certain muscular movements, securing flight or defence, occur, the obvious utility and design of which we at once recognize. Apart from expression, although from their constant association with certain feelings, they become recognized as indications of the latter, and as such, are of use. They may or may not be combined with the Will. They are in some instances, as in the action of Grief on the lachrymal glands, safety valves—mainly outlets of emotional excitement—though not the less useful as constituting a part of the natural language of the emotions. There are, moreover, a number of movements which have more or less lost their primary character and are not now, in the same sense, immediately employed to protect the individual, but are mainly important as outward signs of emotion. These muscular changes appear to be based on those originally performed for the service of the bodily organs, and especially those which minister to sensation.

Gall, who, in spite of the fate of the details of his Organology, was an original observer, a true philosopher, and infinitely superior to most of his critics, made an honest, though unsuccessful, endeavor to account for the character of the movements accompanying the different emotions; and his descriptions of their natural language, independently of his mode of explaining them, have rarely been surpassed. In some of the best-marked examples, the pose and movements of the head are in accordance with the alleged position of the cerebral organs, but this, granting the correspondence, would only explain a part of the movements of the muscles of the face and body; and further, there are emotions characterized by marked outward signs, none (

which appear to receive any explanation from their supposed seat in the brain. Thus, the movements of Anger are not explained by the situation of Destructiveness above the ear, although Gall attributes to this the fact that "the head is drawn between the shoulders, and is carried neither forward nor backward, but makes a rapid movement, or rather it turns rapidly from left to right, and from right to left." With regard also to the action of the teeth, etc., in Anger, such movements are much more easily explained on the principle that the muscles prefigure the form which they would assume in the corporeal acts of eating, etc., and which we witness in carnivorous animals when, under the influence of rage, they tear their prey. The pantomime in man is, in such instances, a figure of the real and completed act in animals. "Why," asks Gall, "does the humble man walk meekly along, with his eyes fixed on the ground, while the proud one struts with expanded chest and head erect?" And his answer is that, as "the organ of Pride has its seat in the median line, in the superior posterior part of the head; during its energetic action it elevates the head and carries it a little backward;" while, as Humility is the reverse state, the head and body are bent forward. "It can only be explained by the absolute inaction and the complete apathy of the organ of Pride" (xxii., v. p. 282). This example is the most plausible that can be adduced in favor of Gall's position. It does not, however, help to explain many of the gestures which we observe in Pride, and which we refer to another principle. As regards the elevation of the head might it not be accounted for by the corresponding attitude assumed when a person on a height has literally to look down from it upon one who is below him; or when a giant regards a dwarf? Hence a proud man is said to be "high," and he is apt to utter tall talk. In the opposite state of Humility, may not the position of the head be explained by a reference to the counterpart form assumed in bodily debility?

Sir Charles Bell, in that fascinating book, *The Anatomy and Philosophy of Expression, as connected with the Fine Arts*, divided the cerebro-spinal nerves into two great classes: the first, or original, comprising those of the Cord and the Fifth Cerebral Nerve, possessed in common by man and the lower animals; the second, the far-famed "Respiratory" or "Superadded" class, introduced to adapt the organ of breathing to man's intellectual nature, arising

from the medulla oblongata and supplying the head, neck, throat, and chest, which thus form "a mechanism for Respiration not found in the lower animals, but gradually introduced by a slow process of development into the animal kingdom, in order that, besides oxygenating the blood, it may be, in Man, the organ of Voice and Expression." This class of nerves it is which is mainly affected by the emotions; in fact, their office, according to Bell, is to communicate our feelings, "not in the language of sounds merely, but in the language of Expression in the countenance also." But the action of the mind on the heart is anterior to that on the lungs. Thus, he says, "Certain strong feelings produce a disturbed condition of the heart; and through that corporeal influence, *directly* from the heart, *indirectly* from the mind, the extensive apparatus constituting the organ of breathing is put in motion, and gives us the outward signs which we call Expression" (cvii. pp. 87, 92, 267).

That the emotions act upon the muscles concerned in expression, through their primary influence upon the heart and respiration, as insisted upon by Sir Charles Bell, can only be admitted up to a certain point, and unless qualified and supplemented, serves to explain the *modus operandi* of only some of the expressions occasioned by emotional excitement.¹

¹ Darwin, who, in his introduction to his *Descent of Man*, says that he had intended including in his work an essay on the expression of the various emotions of man and the lower animals, adds that his attention was called to the subject by Sir Charles Bell's book on the *Anatomy of Expression*, in which he "maintains that man is endowed with certain muscles solely for the sake of expressing his emotions." On this Mr. Darwin observes, "As this view is obviously opposed to the belief that man is descended from some other form, it was necessary for me to consider it. I likewise wished to ascertain how far the emotions are expressed in the same manner by the different races of man." On these two questions, the mass of facts Mr. Darwin is likely to collect together will be of great interest [1872].

I retain this footnote, written before the publication of Mr. Darwin's remarkable book, *The Expression of the Emotions in Man and Animals*, which fulfilled the expectation raised by the previous writings from the same original observer.

I may be allowed to add Darwin's words in sending me a copy of his work: "I have now finished your book, and have read it with great interest. Many of your cases are very striking. As I felt sure would be the case, I have learnt much by it; and I should have modified several passages in my book on Expression if I had had the advantage of reading your work before my publication. I always felt, and said so a year ago to Professor Donders, that I had not sufficient knowledge of physiology to treat my subject in a proper way." (Dec. 22, 1872.) The best proof I can give, that I think Darwin's modesty led him to underestimate his qualifications for the task he undertook, is to cite his conclusions freely in this edition [1883].

"There is," he observes, in his graphic description of the effects of Terror on man, a "spasm on his breast—he cannot breathe freely; the chest is elevated; the muscles of his neck and shoulders are in action; his breathing is short and rapid; there is a gasping and a convulsive motion of his lips, a tremor on his hollow cheek, a gulping and catching of his throat; and why does his heart knock at his ribs, while yet there is no force of circulation?—for his lips and cheeks are ashy pale" (cvii.).

So in describing the overwhelming influence of Grief on woman, he speaks first of the nerveless and relaxed condition of the body—it reclines; the limbs gravitate. Then follow the signs connected with respiration. "Why comes at intervals the long-drawn sigh? Why are the neck and throat convulsed? What causes the swelling and quivering of the lips, and the deadly paleness of the face? Or why is the hand so pale and earthly cold? And why, at intervals, as the agony returns, does the convulsion spread over the frame like a paroxysm of suffocation?" Bell's answer is that these outward signs of the passions in the face and elsewhere cannot proceed from the direct influence of the mind. "However strange it may seem to unaccustomed ears, it is to the heart and lungs, and all the extended instruments of breathing, that we are to trace these effects."

With the required modification of the *theory* laid down, the force and truth of these *observations* may be readily admitted. It is impossible not to see in the oppression of the breathing, and in the expression of the muscles of the face most concerned in respiration, the same effects produced by certain violent mental emotions, which are the result of morbid conditions of the heart and lungs without these mental changes. It seems clear, indeed, as we have said, that the encephalic centre of the emotions must be closely connected with the roots of the nerves supplying the lungs; so that, by a fixed physiological law, secured by connections—not mere contiguity—of nervous fibre, it is almost impossible for the former to be excited without increasing the action of the thoracic organs. But there would seem to be something more than all this—a certain fitness, discernible in many instances, at least, and probably present in all, between the emotion which agitates the muscles of even the mouth and nostrils, and the form which they assume, and which may be due to the action of another and more comprehensive principle.

Bell does not explain why of two equally powerful emotions, one induces a happy, the other a miserable expression of the features, although, in both instances, the heart beats loudly against the walls of the chest, and the breathing is equally accelerated. The palpitation of joy and fear, the breathlessness of delight and alarm, are accompanied by opposite facial expressions. Another principle is at work.

This principle rests first upon the fact that the functions of the bodily organs are assisted and guarded from injury by, and, in short, are dependent upon, the action of the muscles. In regarding the action of the emotions, therefore, upon the muscles, it seems natural to trace their movements to their original use and signification in their immediate connection with the bodily organs, particularly those of special sense.¹

The assistance rendered by the muscles to the bodily organs, and which is effected both by the will and automatically, may be illustrated by their action on the organs of sense.

For example, in ordinary vision the facial muscles, including even those of the eyeball, may be passive, but the moment it is necessary to look intently at an object, they are employed to direct the organ of sight towards it, and exclude impressions from other sources. In addition to the direct action of the muscles of the eye, those of the cheek are raised, and the eyebrows are depressed. More than this, there are accordant or sympathetic gestures of the body. To this class of movements we shall refer under a distinct head.

So, in more than ordinary smelling, the *alæ nasi* are dilated; and to escape a disagreeable odor, the nasal muscles conspire to exclude it.

In listening, again, while the trunk is fixed, the neck is strained in order that the ear may approach nearer to the point whence the sound proceeds, and all the facial muscles assume a significant form, having relation to the organ of hearing.

In tasting, the action of the lips assists in bringing the food in contact with the most sensitive portion of the tongue, and according as it is pleasant or nauseous, they assume different forms. With tasting are closely connected the acts of deglutition, mastication, and respiration, the muscular signs of which are familiar to all.

¹ See footnote at p. 90 of this work.

These muscular actions called forth by impressions from without, and so helping to bring us into relation with the external world, are not, however, confined in their exercise to this directly sensational sphere, but are constantly employed *by the emotions*—and in intellectual operations, as we have seen—being then excited by impressions from within. These emotional movements may, as we have said, be called figurative. Thus, there exists a beautiful correspondence between the play of the muscles from the action of the senses, and from the action of the sentiments. Observe in *Pride*, understood in its coarser form, how much of the outward exhibition of its natural language is associated with the normal action of the muscles when employed in the exercise of bodily functions for wholly different purposes. The muscles connected with the eye no longer direct the attention to other men, or to surrounding objects, for it is exclusively directed to *self*; the nostrils dilate, not as respiratories, but, as it were, “to smell some ideal perfume; and the mouth performs the movements of pleasurable deglutition” (Gratiolet). Indeed he tastes himself. Here, then, we have the muscles of the eye, the nose, and the mouth, as organs of sight, smelling, and taste, affected by non-sensational, or purely mental excitants. The mouth is also affected as an organ of respiration; there is a slight smile of satisfaction, but at the same time somewhat repellent. The expression of Sadness presents a striking contrast, for it is a state, in fact, of disgust, instead of one of infinite satisfaction, in tasting self. Instead of the saliva being swallowed, it is allowed to escape from the mouth, the tendency now being for the lips to open, and the gullet to close; moral disgust is marked by physical disgustation. Gratiolet asks: “Ne dit-on pas à chaque instant que la tristesse amène le dégoût de la vie?”

An enraged man mentally tears his foe in pieces. And is not this emotion clearly reflected in his voice? Sometimes the hated name of Tarquin was pronounced plainly by the maddened Collatinus:

“But through his teeth, as if the name he tore.”

The same principle applies to the actions or gestures of the whole body. Dislike and affection, mental pleasure and pain, occasion general muscular movements similar to those which arise from corresponding bodily states. If the mind repels a sug-

gestion, the attitude assumes the form of resistance; if it hugs a pleasant thought, or embraces a beloved image, every action is in accordance therewith. This manifest action of the law is very noticeable in intellectual operations, and has already been referred to when we spoke of the influence of the Intellect on the muscles.

Thus, the mind acts figuratively through all the muscles of the body, the limbs, the trunk, and the face; but it so happens that the great group of movements classed under the head of "Expression" are mainly those of respiration, and hence the muscles of respiration may be regarded from Sir Charles Bell's point of view as emphatically, though by no means exclusively, those of expression also. But the facial nerve, although employed in respiration, is also employed for movements connected with the external senses; and these sensorial movements are also excited by what may be regarded as analogous or corresponding mental states, and, moreover, some of these are effected by muscles not supplied by nerves included by Bell in his respiratory class. In short, while it is quite true that the emotions affect the respiration, while the lungs and heart are most truly organs of expression, and while the facial muscles are unquestionably affected in their character of respiratory muscles, by emotional excitement, they are also affected by this cause *as muscles of sense*; and all these movements, whether of the respiratory or the sensorial class, assume, in certain states of the emotions or feelings, the same forms as they would if subjected to corporeal impressions, affecting the respiration and the senses respectively. That we can always trace the correspondence, and say this mental expression represents and symbolizes what would have occurred under such and such physical conditions is not affirmed, but that we very frequently can do so, is certain, and that the same law pervades the whole class of emotional movements to which we refer, is extremely probable.

Reverting now to the observation previously made, that the outward signs of pleasurable and painful emotions cannot be easily indicated by any word uniformly descriptive of their presence—by "relaxation and contraction" of the muscles, or even by "expansion and concentration of the expression"—it must here be remarked that the influence of these feelings is all-important from the present point of view. Combined with the principle of figurative movements, which serves to explain why one set of

muscles is called into action rather than another, it becomes true that the form assumed by the features under various emotions is determined by their character, whether painful or pleasurable, just as the muscles of sense are determined by the character of sensorial impressions. As all movements have for their great end the preservation as well as the enjoyment of the individual, and as contraction and relaxation take place primarily to attain this end, a general expansiveness of expression and gesture is allied with all the emotions which are excited by impressions (or generated by ideas) of a beneficent character, while a general exclusiveness or contraction of the features is allied with emotions excited by maleficent impressions, the object of one class of movements being to court and receive, and of the other to avoid and reject.

As pleasurable vision causes one expression of the eye and its surrounding muscles, and painful vision another and opposite one of these parts, and so of all the other senses, respiration, deglutition, etc., so pleasurable and painful emotions, in affecting the muscles connected with this or that sense, will cause them to assume the form proper to their own sensibility.

Frequently an emotion excites all the sensorial and respiratory muscles; at other times the influence is distinctly partial and circumscribed, the muscles of one sense only being called into mental activity. In the original form of the features in their relation to the exercise of the sensorial and respiratory functions, we have traced the sentinel-action of the muscles subserving these functions, admitting or excluding impressions, according as they are beneficial or noxious, pleasurable or painful. If a stream of light is painful to the eye, all the muscles concerned unite in excluding it and protecting the sight; if agreeable and salutary, they combine to favor its entrance.

The parallelism on which we insist remains unaffected, whether we adopt the hypothesis of the sensationists or the conservationists. Indeed, it is admitted that the law of conservation is usually secured by, and is ever in accordance with, a system of pains and penalties. It may be by virtue of a primary conservative reflex law that we close our eyes to a strong light, but the pain we endure by continuing to gaze at it soon obliges us to do the same thing. In either case, or which ever explanation be given, the muscles connected with the organ of sight unite in protecting it

and excluding the light; and analogous mental states induce the same changes. In fact, Professor Laycock, the most able and uncompromising advocate of the *Lex Nostræ conservatio*, fully admits that in states of consciousness, conservation is usually secured by feeling. Thus, after observing that as a feeling of pleasure or pain is very often associated with the action of the conservative machinery, the inference is unjustly drawn that feeling is the cause, he says, "Pain is the sentinel of the organism," which "ushers in or accompanies a series of vital changes, the end of which is the prevention of evil, or the restoration of health from illness" (lv., ii. pp. 27, 35).

Pleasurable and painful sensations from without determine, then, the form which the muscles called into action assume; the purpose being to protect the organs. Similar muscular changes arise from the emotions, according as they are pleasurable or painful, in consequence of the harmony between mental and bodily acts. The mind, figuratively speaking, sees, hears, smells, tastes, touches, and respires, and with each of these mental operations the feeling of pleasure or pain may be associated and affect the muscles accordingly. The emotions may eagerly receive or forcibly reject the stimuli which excite them. In regard to the action of the respiratory muscles, it is necessary to supplement the excitement they undergo through the action of the emotions upon the heart and lungs as laid down by Bell, by the principle under consideration. The form which the muscles of the mouth assume (regarding it here as an organ of respiration) in laborious breathing, is designed to assist it, and when certain emotions arise, the same expression of these muscles presents itself. What before was a mechanical act in aid of respiration becomes the natural language of the breathings of the soul. The pleasurable emotion which causes a smile relaxes the mouth, inducing an expression which corresponds with that excited by the respiration of pure air. Joy accelerates the action of the heart and the circulation; the respiration is quickened, and the muscles of the mouth tell the tale, while laughter is effected by a convulsive form of respiration. On the other hand Fear takes away the breath, and produces on the facial muscles the character impressed by dyspnœa from pulmonary obstruction.

By way of summary, it may be said: We suffer pain of two kinds—bodily, as toothache; mental, as grief or anxiety; and

when the latter occurs, the outward signs, allowing for local differences, are the same as those which are exhibited in the former. Hence, when Joy and Fear, respectively, cause respiratory and cardiac excitement, the expression of the features is entirely different—the form assumed being determined by the corresponding bodily form excited by common and special sensation—the rough outline of general expression representing common sensation, and the delicately specific shades answering to the predominating special sense figuratively affected.

It cannot, in short, be too strongly insisted upon in connection with this subject, and particularly in reference to Sir Charles Bell's doctrine, that the same facial muscles perform different functions, and that, therefore, the so-called respiratory nerves supply muscles which are used not only in respiration. Take (*e. g.*) those connected with the mouth. They are not merely muscles of respiration—but also of taste and prehension. So far as they are respiratory in character, they will be influenced by acts of respiration, and hence whatever emotion disturbs the action of the lungs may affect the muscles of the mouth. But mental states may act directly on the mouth in its other functions, and without exciting the action of either the heart or lungs.

The respiratory muscles, again, may be excited by an emotion, and two very different emotional states may to this extent have a common effect; but the particular form the facial muscles assume, may be completely modified by the figurative expression which the muscles assume in accordance with the character of the emotion—especially whether painful or pleasurable.

I have reserved to this point a statement of the fundamental principles laid down by Darwin. They are by no means inconsistent with those which I have already maintained. There are according to him three great principles of expression; *first*, that of *serviceable associated habits*. Certain actions are of service under certain states of mind in order to relieve or gratify certain sensations or desires, and whenever the same state of mind is induced, however feebly, there is a tendency through the force of habit and association for the same movements to be performed, though not then of the slightest use. The Will can repress some of these, but the muscles least under its power will still act and cause movements recognized as expressive. In other instances, slight movements, also expressive, are required to check one habitual

movement. *Second*, the principle of *Antithesis*. When an opposite state of mind is induced, there is an involuntary tendency to perform movements of a directly opposite nature, although of no use whatever, and these are also very expressive. *Third*, the principle of actions due to *the constitution of the Nervous System independently from the first of the Will, and independently to a certain extent of Habit*. In short, *the direct action of the nervous system* (xcv. p. 29).

Darwin applies his leading principle of associated habit to the influence of emotion on the voice, which, he says, "from having been habitually employed as a serviceable aid under certain conditions inducing pleasure, pain, rage, etc., is commonly used whenever the same sensations or emotions are excited under quite different conditions, or in a lesser degree" (xcv. p. 84).

In the first instance, the excitement of the sensorium through emotion would strongly excite the muscles generally, and consequently sounds would be uttered, although of no use. These purposeless contractions of the muscles of the glottis and chest "*may*" have first given rise to the emission of vocal sounds. Thus cautiously does Darwin put it. He then proceeds to refer to "the various purposes" for which the voice is now largely used by animals, including what he regarded as "the primæval use" of the voice; the endeavors made by the male to charm or excite the female. Again, rage produces violent action of all the muscles, including those of the voice. Animals, when in anger, "endeavor to strike terror into their enemies by its power and harshness. . . . Rival males try to excel and challenge each other by their voices, and this leads to deadly contests. Thus the use of the voice will have become associated with the emotions of anger, however it may be aroused" (xcv. p. 85).

As to the different sounds uttered under different emotions, Darwin himself confesses that the subject is "very obscure," and he did not think it probable that "any precise explanation of the cause or source of each particular sound, under different states of the mind, will ever be given" (op. cit., p. 85). Nor could he explain why particular sounds give pleasure (p. 88). The musical character of the voice under the influence of some strong emotions was supposed by Darwin to be due to the progenitors of man having probably uttered musical tones before they acquired the power of articulate speech. The pitch of the voice varies, as he points out, with certain states of feeling, as we witness in the

high-pitched voice of a person complaining of ill-treatment. Groans and screams, however, are alike the vocal expressions of agony, though of different kinds. On the other hand, it is natural that if an animal calls for assistance the cry will be loud and long, while those designed to please the female will be sweet, and those intended to frighten the enemy will be harsh. A tremulous voice is the obvious result of fear causing the muscles to tremble, and it becomes husky from the dryness of the throat and mouth, the well-known influence of fear on the salivary glands coming into play (see xcv. pp. 91-93).

To rebut Sir Charles Bell's position that the vocal and respiratory organs are specially adapted for expression, Darwin adduces the fact that not only is there a prior and direct use for certain sounds, but that "sounds otherwise produced serve equally well for the same purpose" (xcv. p. 94). Thus there is the angry humming of bees, useful as "a warning that there is a danger of being stung." Some insects make a noise by rubbing together parts of their hard integuments, which constitutes a call to the female. Storks make with their beaks a loud noise, and so on.

In the prominence which has been given to the more particularly Darwinian explanation of the expression of the emotions, the importance attached by Darwin to the direct action of the emotions on the nervous system in causing such expression has been too much overlooked. Yet there is no sufficient excuse for this; for Darwin, with his accustomed fairness, distinctly says, "on the whole we may conclude that the principle of the direct action of the sensorium on the body, due to the constitution of the nervous system, and from the first independent of the Will, has been highly influential in determining many expressions" (p. 81). All he says is, that emotional actions are "often combined with others which follow from our first principle, namely, that actions which have often been of direct or indirect service, under certain states of the mind, in order to gratify or relieve certain sensations, desires, etc., are still performed under analogous circumstances through mere habit, although of no service." Darwin was also candid enough to admit that after applying his and the more usual principles to explain the effects of emotion, "very many points in the theory of Expression remain inexplicable" (xcv. p. 82).

The *language* which we employ in reference to mental acts illustrates, in a remarkable manner, the figurative character of the movements referred to under this head. Thus, as a state of mental disgust may cause an expression of the mouth similar to what is seen in threatened vomiting, so we speak of *loathing* in regard to the objects contemplated by the mind. We loathe the idea of a certain act, as much as a certain nauseous drug. Dr. Chalmers, in one of his sermons, referring to some opinions from which he strongly dissented, exclaimed, "I *nauseate* them!" A lady who heard him informs me that the emphatic enunciation of the word, and the accompanying gesture, indicative of nausea, had a most striking effect. In the muscular changes originally associated with nausea and vomiting, there was an obviously direct design and physical use, altogether apart from expression; but the corresponding changes induced by emotion are merely figurative, although they became serviceable as outward signs, the uniformity of these signs constituting their utility as a natural language. No savage expresses grief by laughter, however true it may be that some of the African tribes, as described by Sir Samuel Baker, make merry at the funerals of their relations. The obvious explanation of this seeming anomaly is that Grief is not felt, but Joy. An admirable popular illustration of the uniformity of natural language will be found in *Greyson's Letters*, by Professor Rogers, in which the absurd effects of supposing a reversal of the fixed signs of grief are humorously described.

Illustrations of figurative language derived from figurative movements abound; but a few additional ones will be sufficient for our present purpose. A stifling smell induces muscular contractions in the nasal muscles calculated to avoid it; and a bad moral odor affecting the mind will cause a very similar expression. The corresponding language may be found in a line of *King John*, where Shakespeare makes Salisbury say—

"For I am stifled with this smell of sin."

So again, as the motion of the lips, and even deglutition, may indicate that we are mentally tasting and relishing a certain pleasurable idea, we employ such language as "the mental palate," "a man of taste," and we speak of "disgusting" and "distasteful" in reference to purely subjective phenomena.

Tact is the psychical analogue of touch, but of course has in-

finitely wider relations than those possessed by mere tactile sensibility.

The influence of the emotions on the original formation of words may sometimes be traced with tolerable clearness. If we wish to express contempt, we say, *Pooh!* Now, it is evident that this originates in the act of throwing out the lips, so as to reject something that is distasteful. What? An idea. The gesture is precisely the same as that which we employ in order to rid the mouth of a material substance with which we are disgusted, and is therefore figurative. In the same way we may trace the words *putidus*, *fetidus*, etc., to their roots *ptt* and *ftt*, which are the natural sounds produced by the labial movements indicative of disgust. There are also guttural sounds expressive of still greater disgust, *arrrh* and *krrrh*, which appear to be the bases of words in various languages, as *cracher* in French.¹ Probably *ptt* is the root of our *s-pit*. The word *hiss*, again, is derived from the sound made in emotional states of hate and contempt. The sound is derived from the labial gesture, and the labial gesture is similar to, and figurative of the movement performed by the sudden jerking expiration employed in expulsion. We try to show our scorn by expelling a certain individual or idea from our thoughts. A reverse action is expressive of assent, and produces an inspiratory or suction sound; one, at least, very common in Cornwall.

As we have already observed, some movements are of a *sympathetic* character. In the use of the bodily organs, in addition to the action of the muscles directly required, other movements arise which are in unison with them. The whole body—the attitude and gestures—will thus sometimes display sympathy with the exercise of only one sense. “Whether one member suffer, all the members suffer with it; or one member be honored, all the members rejoice with it.” This apparent excess of action is readily explicable as being correlated to the central disturbance, since the flow of nerve energy is directly proportionate to the causative emotion. It must not, however, be forgotten that this sympathy may be as much shown by passive as by active forms,

¹ Cf. Gratiolet, *op. cit.*, p. 161. He traces to the various sounds made between the lips and the throat, *frrr*, *trrr*, *rrrr*, *grrr*, the words *φριξ*, *frigus*, *froid*, *frayeur*; *τρεμω*, *tremor*, *terreur*; *ῥιγος*, *rigor*, *roideur*, *horreur*; *gronder*. We may add our English words, *fear*, *fright*, *terror*, *horror*, *roar*, *growl*.

by respectful and considerate relaxation as by jubilant contraction.

It follows that when an emotion excites any of the muscles figuratively, the other muscles will be excited sympathetically, as they would have been by the original action of the bodily organs in what we have, for the sake of distinction, termed sensational movements. In this way the contraction or relaxation of many of the muscles, consequent on emotional excitement, may be explained.

Section II.—Irregular and Excessive Muscular Contraction: Spasms and Convulsions.

To some extent we have anticipated the consideration of the influence of Emotion on spasmodic action of the muscles, in describing the effects produced by powerful emotional states, as Terror, which often causes excessive or spasmodic contractions, sometimes amounting to tetanic rigidity. The sobbing of Grief, the laughter of Joy, afford daily examples of spasmodic muscular contraction from emotional stimulus. The spasm which chokes the voice and converts the fibres of the platysma myoides into rigid cords in Terror, the convulsion and tremors of the facial muscles in Despair, the clenched hands, the convulsive opening of the mouth and spasm of the diaphragm and muscles of the chest in Fear, the spasm of the jaws in Rage, the spasmodic rigidity of the muscles in a maniacal paroxysm—are they not written in the graphic pages of Bell? With the exception of mania, these illustrations of spasmodic contractions are consistent with health. We shall include under the present section all convulsive attacks, whether epileptic or not, whether infantile, puerperal, or hysterical, trembling palsy, chorea, spasms of the larynx and pharynx, nervous hydrophobia, and tetanus. Physiologically, they may all be referred, when of emotional origin, to disturbance, more or less serious, of the functions of the sensori-motor apparatus, especially the medulla oblongata.¹

When the mind is affected by witnessing a frightful sight or hearing dreadful news, the impression is conveyed—a certain molecular change occurs—along the nerves of special sense to the

¹ This is borne out by the latest researches in this portion of the nervous system, especially those of Woroschiloff [1883].

brain, and the emotion excited agitates, through the sensori-motor centres, the muscular system. If, on the other hand, a terrific image is formed in the mind, independently of stimuli from without, the muscles are aroused to more or less violent action by the idea exciting emotions which operate upon the sensory centres and ganglia, in the same way as when they are called into action by the nerves of special sense. Whether Emotion acts in inducing abnormal and excessive action of the muscles, in a similar manner as the electric irritation of certain nervous centres induces convulsions, is a more difficult question, on which much difference of opinion still exists; but its determination does not affect the statement just made.

EPILEPTIC CONVULSIONS.—Although all the forms of spasm and convulsion have the one point in common—that of involuntary, irregular action, clonic or tonic, of the voluntary muscles—we have sooner or later when Emotion occasions epilepsy, something more—loss of consciousness.

The influence of violent emotion in causing epileptic attacks will not be disputed. How this is brought about is by no means certain. On the one hand we know comparatively little of the mode of action of emotion in the healthy brain, or, on the other, of the pathology of epilepsy. It may be that, in accordance with the opinions now prevalent as to the *modus operandi* of epileptic attacks, mental shock or excitement in an unstable brain causes an “explosion” of nervous power in the cerebral cortex, which passing down the efferent nerves induces convulsions; unconsciousness resulting, as is alleged, from the exhaustion of the cortical cells or from interference with the ordinary nerve currents by excessive discharge. Todd, Van der Kolk, and others have employed the familiar illustration of the Leyden jar. Continual malnutrition, according to this view, causes disturbance of the polar state of some region of the encephalon. If amounting to a certain intensity it is manifested in an epileptic fit, as the jar, when charged “with electricity to a certain state of tension, gets rid of the disturbance of equilibrium by the disruptive discharge” (Todd’s “Lumleian Lectures,” 1849). And the Dutch physician compares the ganglionic cells to galvanic or electric batteries, which must be charged to a certain extent before the electricity accumulated in the Leyden jar has acquired sufficient tension to discharge the flask (lvii. p. 215).

Dr. Hughlings Jackson's well-known views are in accord with this position, although much more definitely worked out as to the share taken by the cortex in these discharging lesions. The true pathology of epilepsy remains, however, obscure, and we repeat, therefore, that until the physiology of emotion and the pathology of epilepsy are better understood, we must be content to confess our ignorance and to await a further advance of knowledge before we can say how emotional epilepsy is induced. The above mentioned views, even though they seem to derive support from Ferrier's researches, are confessedly hypothetical.

The experiments of Kussmaul and Tenner on animals, made with a view to determine the cause of convulsions, bear upon the question of vascularity. They are so well known that it is only necessary here to recall the position in which they leave the question as to the nature of epileptic and eclamptic attacks—namely, that it is probable “that epileptic convulsions can be brought about by contraction of the bloodvessels induced by the vasomotor nerves” (xlii. p. 101).

But whatever be our surmises as to the pathology of convulsive seizures, they must not be allowed to divert our attention from the more obvious truths, that the emotions when sudden or excessive in character do, by their downward influence through the medulla oblongata, produce altogether involuntary movements, convulsive in character; that these emotions may be excited from without through the senses, or from within by ideas; and that the convulsive movements succeeding these emotions may be epileptic. Malnutrition of the nervous tissues may doubtless be induced by a prolonged emotional disturbance like grief, and then the first paroxysm may be induced by other than psychical stimuli—the impaired nutrition having probably been caused by the influence of a depressing emotion on the blood, and the particular disease, epilepsy, being determined by individual predisposition.

The following case of convulsions was of emotional origin. I abridge the report of the case given by Dr. Althaus in the *Medical Times and Gazette*, April 24, 1869.

Mary B—, æt. 16, one of fifteen children of the same mother. The mother says none of her other children have had fits, but that she had a succession of frights when *enciente* with this child. The girl herself had her first fit after a fright, some other children

having played at ghost with her in a cellar. This was when she was five years of age. Some years afterwards she had another fright, by a woman coming up to her while she was playing in the street, and swearing at her. Since this she has never been quite free from fits. The convulsive seizures are well marked, commencing with a scream; the head is turned to one side, there is foam at the mouth, the tongue is bitten, the urine often passes involuntarily. The convulsion lasts four or five minutes, during which there is complete loss of consciousness. After the fit, the patient sleeps for half an hour, and then wakes with a bad headache, and speaks slowly and thickly for some time. There is no aura with these fits, which occur at intervals of two or three weeks. Sometimes she has a succession of five or six in the same day; at others only one or two at a time. The attacks of petit mal are much more frequent, as she has sometimes thirty or forty such seizures in one day, and rarely goes three or four days without any. Four months' treatment with bromide of potassium relieved her of the convulsions, but the petit mal remained the same. A month after this, during which galvanism was applied to both mastoid processes and the cervical sympathetic twice a week, report is made, "much better in every respect. Since galvanism was commenced she has only on three occasions had fits of petit mal, and then only four or five where she had thirty before." November 12th.—"Has had altogether ten applications of galvanism. Had last attack of petit mal early in August. Last convulsive attack March 3d. Apparently well. Ceased attendance."

In another case, under the care of Dr. Althaus, the disorder was attributed by the patient to a great deal of trouble and anxiety, and was also preceded by a great fright when he was awakened by an alarm of the house being on fire.

When admitted into the Infirmary for Epilepsy and Paralysis he was thirty-six, and had suffered for six years from irregular attacks of petit mal, the attacks being marked by severe pain at the back of the head, and a thrilling sensation going through him, as if about to die. Sometimes it appears to him "as if a vapor rose on his brain and muddled him." This lasts only about a second, and he then quite loses his consciousness for about a minute. While in this condition, he will perhaps scratch the plate with his knife, or tear up paper or his clothes, or pull a

handkerchief over his head, or, if in the street, put mud on his clothes, etc. When he comes out of these attacks he feels very confused, and sees double for two or three minutes. Within an hour or two he has quite recovered himself. These fits happen two or three times a week, generally only one in a day, and but very rarely two or three at a time. From Nov. 27, 1866, to April 2d, he took sulphate of zinc, cod-liver oil, and nitrate of silver, but, although the general health improved, the fits remained as frequent. Galvanization of both hemispheres and the medulla oblongata was then ordered twice a week. In the course of the next month he had only one fit, in which he tore his waistcoat; and the report of Oct. 15th says—"Has had altogether fifteen applications of galvanism, and no fit during the last four months. Ceased attendance" (xlv., May 8, 1869).

Trousseau records the case of a man, *æt.* 36, who was under his care for epilepsy five years previously. He had been suddenly awakened and frightened in the night "by horrible shrieks from his wife, and a few days afterwards he had his first attack" (liv., i. p. 40).

It is a remarkable circumstance that in some cases of emotional epilepsy, the same alarming event which in the first instance induced an attack was immediately brought vividly to mind, and was uppermost in the thoughts whenever an attack subsequently occurred, although occasioned by other circumstances. A case of this kind is related by Trousseau, who endorses the observation of Jules Falret, that "many persons who have become epileptics after strong moral emotions, or intense terror, see again in spirit or before their eyes, on each succeeding seizure, the painful circumstances or the dreadful scene which first produced their complaint." The case is as follows:

A boy, *æt.* 11, lost his mother. The wound made so deep an impression upon him that he was seized with epileptic convulsions. He was seventeen when he was placed under treatment at the hospital, and it was found that on the accession of every fit, which had been of frequent occurrence during the six years, this painful circumstance invariably recurred to his mind. "I am seized through my thoughts," he used to say, and he explained to his medical attendants that his thoughts were always the same, and had constant reference to his loss (liv. p. 71).

That many cases of convulsion, of an epileptic character, are

incorrectly referred to an emotional cause is no doubt true, but with a liberal allowance for the influence of other causes which may have been overlooked, it is impossible to deny the great importance of powerful emotion in the etiology of this affection. After observing that mental influences are far more frequent causes of epilepsy than injuries, Romberg states that, among forty-four cases, the causes of which were carefully examined by Cazauvieilh, he found that in thirty-one they were due to influences of this nature. He adds, that "no disease is so liable to be produced by Fright as this affection, which may itself be excited by the sight of an epileptic paroxysm; the next most frequent influence of this description being Fear, an agent that came into operation more often in former times, when tales of ghosts and hobgoblins were the bane of the nursery, than at present; Anger also comes under this category as an exciting cause. The simulation of epilepsy also operates as a mental influence, and is said, occasionally, to pass into the real disease" (xxxviii., ii. p. 213).

"The form of epilepsy arising from Fright," observes Marshall Hall, "is of the most intractable character" (xvii. p. 39). In sixty-seven cases, of which the cause was traced by Leuret, it was found that in no less than thirty-five the first symptoms were preceded by fright. It is to be presumed that an observer like Leuret would satisfy himself that the interval between the attack and the fright was not so great as to render the circumstance merely accidental. Trousseau, who is disposed, I think, to under-rate the frequency of this cause, admits that he has ascertained the fact of Fright being a cause "on several occasions," and from him I have obtained the following illustration:

"Very recently," he says, "I was consulted by a Brazilian, whose first attack seemed to have been manifestly brought on by Fright. Whilst on a long journey through his country, he had gone to a lonely inn, where he happened to witness a quarrel between some individuals who were armed, and who from high words came to blows. One of the men, mortally wounded by the discharge of a gun, as well as stabbed with a knife, fell down dead in his presence. He was horribly affected by the scene, and a few days afterwards, whilst dining with a friend, he was seized with epileptic vertigo. Since that time, and for the next five years, he was every day affected in the same way. The attacks were ushered in by a sensation of great heat, beginning at the

navel, and rising up the back, which was followed by absolute loss of consciousness for the space of two minutes or so. They sometimes passed away so quickly that they were not noticed by anybody near him. At the end of five years convulsive seizures supervened, which were at first mistaken for apoplexy, and recurred at intervals of from twenty to thirty days. The vertigo disappeared from that time. He was treated by a physician at Rio Janeiro, and for the space of four years and eleven months he was free from an attack. After this interval the convulsive fits recurred again, as intense and as regular as before; persisting for six years. They then became less violent again, although more frequent, and occasionally attacked him during the night. He stated positively that no member of his family had ever been similarly affected" (liv., i. p. 52).

In this case it will be seen that emotional excitement, although not causing at the time epileptic convulsions, acted powerfully upon the brain and induced the morbid condition which characterizes the *petit mal*.

We may fairly draw an illustration from the customs of the Sandwich Islanders, exhibiting the remarkable influence of the emotions allied with imagination upon the bodily frame, in inducing epileptiform convulsions. Mr. Ellis says that when a priest imagined that the god had entered his person, he became violently agitated, the muscles of the limbs were convulsed, the body swelled, the features were horribly distorted, and the eyes wild and strained. He often rolled on the ground, foaming at the mouth, and then in shrill cries made declarations which were regarded as the utterances of divinity. Then the paroxysm usually subsided, and the priest became comparatively composed. (See *Polynesian Researches*, i. p. 373.) Doubtless, in some instances, the priests merely *imitated* the signs of the genuine and spontaneous result of the imagination excited by their superstitious beliefs and expectations; but there is no reason to doubt that in other cases the effects produced were real.

Mr. Ellis observes, in the same work, that if any native uses sorcery against another, whose destruction he desires, he employs a tahu-tahu (a charm), to obtain the coöperation of the demons, and to induce the *tii*, or spirit, to enter into the victim of their malice. The parings of the nail, a lock of hair, the saliva, or other secretions, or a piece of the food which he would eat, was

the vehicle by which the demon was supposed to enter the person. The sorcerer performed incantations over it at his house; if food, it was then placed in the basket of the person for whom it was designed, and if eaten, inevitable destruction was expected to follow. When the incantation was performed only on a lock of hair, etc., the effects appear to have been similar and death speedy. "The most acute agonies and *terrific distortions of the body* were often experienced; the wretched sufferer appeared in a state of frantic madness, or, as they expressed it, torn by the evil spirit, while he foamed and writhed under his dreadful power."

Two boys were sent to a man's house for arum roots. He was from home, but the boys went to the field and procured them. The owner, who happened to be a sorcerer, returning before they had left, pronounced the most dreadful imprecations upon one or both of them, threatening them with the *pifao*, or "agony of body from possession, equal to that arising from a barbed spear or hook." The boys returned. One of them was shortly afterwards taken ill, and his friends concluded that it was the result of the malediction. The Missionaries, who were sent for, found him lying on the ground, *writhing in anguish, foaming at the mouth, his eyes starting from their sockets, his face distorted, his limbs violently convulsed*. He soon after expired in dreadful agonies. It is said that the boys "apparently took no notice of the threatening," but on this important point, more definite evidence would be required to prove that they did not. But whether they did, or not, at the time, their superstitious friends would not fail to impress them with their danger, and thus the most credulous or susceptible of them would be in danger of falling a victim to Fear.

On the whole, looking at the character of the symptoms in this and other cases, as also their general uniformity, there can be no doubt that, setting aside those instances in which food was taken and poison probably introduced, many deaths resulted from the influence of Terror and Expectation upon the organic functions. At the same conclusion, arrives the thoughtful and observing writer to whom we are indebted for these particulars, and with whom we have had the advantage of conversing on his Polynesian experiences. "Imagining," says Mr. Ellis, "that he was already delivered to the sorcerer's power, hope was abandoned, death deemed inevitable, and the infatuated sufferer became the victim

of despair." It is quite in accordance with this mode of explanation that the Europeans were proof against the incantations of the sorcerers.

Dr. Arthur Mitchell, in his *Morisonian Lectures on Insanity*, records a melancholy example of the influence of Fear in inducing convulsions (and subsequently idiocy).

"A healthy, well-nourished boy, nearly two years old, was lying in his cradle, when a cock perched on the hood. The boy was at first amused and delighted, and made vain efforts to reach the bird with his hands. These signs of delight, however, began to grow less evident, the child ceased to smile, but his attention continued to be intently fixed on the animal, which, in its turn, appeared to become interested in the child. Up to this point the little fellow gave no sign of terror; but there was something like it, though still unexpressed, when the cock, stretching his neck, put his head down and looked closely at the boy's face; and when, raising his head again, he flapped his great wings and uttered a shrill cry, the child gave one sharp cry of pain, and was instantly convulsed. Three or four fits occurred during that and the next day, but never again. The boy, however, grew up an idiot" (xxxii., March 19, 1870).

Such convulsions are the physical expression of the violence of the central emotional disturbance, and thus are an exaggeration of the conditions described under the head of Sympathy.

PUERPERAL CONVULSIONS.—It is well known that these occur frequently from psychical causes. Dr. Gooch, than whom few have had more experience, observes that "depressing passions of the mind produce this complaint; unmarried women, who have passed the later months of pregnancy in solitude and wretchedness, are very likely to be attacked with it; and it is found in lying-in hospitals which admit unmarried women, that a large proportion of cases of puerperal convulsions occur among females of this class." (*Practical Compendium of Midwifery*, p. 243.)

Sir James Simpson reported a case of a lady who after her confinement had puerperal convulsions, in consequence of receiving a packet containing a living mouse. We write from memory, having mislaid the reference, but if we remember rightly, the intention of the sender, another lady, was to frighten the patient.

This is the most convenient place to refer to other forms of spasmodic muscular action, arising under emotional excitement,

and ordinarily styled *hysterical*, and presenting all degrees of irregular movements, from the simplest spasm to the severest convulsion.

When we speak of irregular movements which are considered hysterical in their character, we are in danger of being lost in vague generalities; in no disorder are we so easily carried away by a mere name, as in hysteria. One thing, however, is certain, that while a considerable number of cases are clearly referable to uterine and ovarian disorder exciting reflex action of the sensori-motor apparatus, many as clearly originate directly in emotional disturbance of the same centre. The symptoms arising from these different causes may be precisely similar, and, without the history of the case it would be impossible to decide as to its psychological or physical origin. If we hold, as undoubtedly we must, that all physical phenomena (including irregular movements) which can be induced by reflex action from the irritation of a bodily organ, can also be induced by central cerebral irritation, then even if we agree with those who define hysteria as "a reflex neurosis dependent on sexual irritation," we must believe that emotional excitement can primarily produce the same disorders, without springing from or involving the peripheral organs. At the same time it is manifest that in a large proportion of cases, the condition of the uterus and ovaries in women, and the corresponding state of the reproductive organs in men, induce a morbid susceptibility of the sensori- and excito-motor centres, which renders them peculiarly liable to emotional excitement. The former is the predisposing, and the latter the exciting cause. On the other hand, it must be admitted that, in many instances, the morbid condition of the organs is itself induced by the downward action of the feelings.

To determine which has been the *point de départ* in this psychophysical circle is often impossible. We may, however, frequently ascertain how the first outward manifestations of the disorder have originated, and be certain that they have been called into action by a central emotional stimulus. In women there is confessedly greater emotional instability, and in them reflex action is easily excited, but this natural susceptibility, or "hyperæsthesia," is no doubt greatly aggravated by uterine irritation. This heightened tendency of the nervous centres to act independently of volition, exposes them to irritation from every source, periph-

eral or centric, uterine or emotional. When persons in health, subjected to the excitement of popular tumult and alarm, or the influence of religious revivals, display the group of symptoms ordinarily understood as hysterical, we can have no hesitation in acknowledging a psychical—an emotional—cause. That a predisposition or diathesis exists (the female nervous system being in itself a predisposing cause), which occasions the symptoms to be something more than the ordinary effects of Fear—pallor, tremor, etc.—and something less than genuine epilepsy, would seem clear. Emotional states being so intimately connected with hysteria, the attempt is too often made to comprise under this one name the various phenomena which are excited by powerful and alarming appeals to the feelings, or by fright of any kind, instead of remembering that with different proclivities, different forms of disorder will be elicited, and not all properly speaking hysterical, although having, in common, the automatic and reflex character belonging to hysteria. All hysterical movements are reflex or automatic, but all reflex movements are not hysterical, if we employ the term in any distinctive sense at all. While in some, the effects of violent mental impressions are almost *nil*; in others, slight tremor and pallor; in others, syncope; and in others, convulsive seizures, which in those predisposed or subject to epilepsy will be really epileptic; in a fifth class we see what every one recognizes as a fit of hysterics, or hysterical simulations of epilepsy and other motor affections. Of course, the attack takes its color from the character of the excitement which produces it, as is witnessed in religious revivals. Were we to take our description of the scene often presented on such occasions from the accounts of one which occurred more than half a century ago in Cornwall (when four thousand in various towns—Falmouth, Redruth, Camborne, etc., were convulsed), and compare it with the descriptions so frequently given in recent times of the effects produced in America, Ireland, and England by excited harangues and denunciations of eternal perdition, we should not fail to find a striking similarity in the symptoms. For instance, the account given in *Fothergill and Want's Medical and Physical Journal* (lxix. p. 145), so long ago as 1814, would do as well now as then for one class of cases. Thus we find—Yawning, violent spasms of the muscles of the eyelids, the eyeballs themselves being fixed and staring, frightful contortions of the countenance,

then convulsions (passing downwards) of the muscles of the neck and trunk, sobbing respiration. General agitation and tremors, the head thrown from side to side, convulsive beating of the breast, and clasping the hands, accompanied by many frightful gestures, followed; the lower extremities alone escaping. At Ballymena, at the commencement of the Irish revivals, in our own day, the physical phenomena were very similar, and others were present of a more tetanic character. We are indebted to Dr. Massie's *Revivals in Ireland* for the following illustration of the influence of the emotions upon the body, especially the muscular system: A neatly attired young woman, about 22, had been stricken an hour previously, and was supported in the arms of an elderly female, who was seated upon a low stool. Her face was deadly pale, her eyelids firmly closed, except when partially raised by a convulsive paroxysm, and then no part of the eye was visible, except a narrow line of white; pulse intermittent; great perspiration; arms extended or elevated, and then the hands clasped with great energy, and her features rigidly fixed into an expression of supplication; utterance rather incoherent; agonizing expressions of despair. A striking expression is employed in one description of the stricken. "In all cases it appeared as if every fibre of the heart and every muscle of the body were wrung with the same excruciating torture." A young woman is described as lying extended at full length; her eyes closed, her hands clasped and elevated, and her body curved in a spasm so violent that it appeared to rest, arch-like, upon her heels and the back portion of her head. In that position she lay without speech or motion for several minutes. Suddenly she uttered a terrific scream, and tore handfuls of hair from her uncovered head. Extending her open hands in a repelling attitude of the most appalling terror, she exclaimed, "Oh, that fearful pit!" During this paroxysm three strong men were hardly able to restrain her. She extended her arms on either side, clutching spasmodically at the grass, shuddering with terror, and shrinking from some fearful inward vision; but she ultimately fell back exhausted, nerveless, and apparently insensible. In a third case, the face of a woman was deadly pale, the features rigid, the lips clenched, the hands clasped firmly together, and the head moved from side to side, as if to indicate internal agony.

At other times the force of the emotions fell chiefly on the

respiratory centres; the thoracic muscles were spasmodically fixed; "an intolerable weight was felt upon the chest, and a choking sensation experienced." Such cases have more especially suggested the employment of the word hysteria in reference to the revival cases, because the most prominent symptoms of hysteria betoken functional disorder in the range of the respiratory nerves.

It is obvious that many restrict the term hysteria to those cases in which there exist symptoms which common consent attributes to it (sobbing respiration, globus hystericus, etc.), in full force at the time, and doubtless they constitute typical examples; but without these, we may strongly suspect from some one symptom in the history of the case, that the same morbid susceptibility of the nervous centres is present, and causes reflex phenomena, which are the counterfeits of nearly all the disorders to which the frame is liable. The single circumstance of the disorder occurring in a young female (*e. g.*) is itself a presumption in favor of the hysteric character of this susceptibility.

The important point here (though not nearly so much so as to distinguish between functional and organic disease) is not to refer to this hysteric susceptibility or exaltation, reflex phenomena which arise without any evidence whatever of its having been present; for clearly an excessive stimulus of the emotional centre may cause a healthily susceptible sensori-motor apparatus to respond too violently, in short, convulsively. To which class to refer phenomena which are often so closely allied, is a question the decision of which will depend upon the whole history of the particular case. Hence, and from using the term in the broad and narrow sense, differences of opinion arise. Thus we find Dr. Cuthbert, of Londonderry, himself a witness of many of the Ulster revival cases of 1859, protesting in the *Medical Times and Gazette*, of Nov. 5th of that year, against what he regards as the too indiscriminate reference of the whole to the convenient category of hysteria. There was, he says, one class of cases in which the mental condition appeared to regulate altogether the physical state, and there was no globus or diuresis; cold water assiduously applied had no effect; with returning mental quietude the bodily symptoms declined. In a second class, the morbid symptoms were no doubt hysteric, and the term "cataleptic hysteria" is applied to them by the writer. Lastly, there were cases in which

hysteric symptoms arose, not, apparently, directly from the impressions produced on the mind by the Revivalist preachers themselves, but as the result of sympathy and imitation. In a letter written recently (June 16, 1870), Dr. Cuthbert informs me that he believes the conclusions he then arrived at to be correct. "In a large number of cases, the physical symptoms were but the natural expression of mental impressions. I still consider that the symptoms in a large number of cases were not those of hysteria." I may add a significant remark, although it has nothing to do with my present object—"The good effects, I think, were *in inverse proportion* to the physical manifestations." I should observe that in the cases which came to Dr. Cuthbert's knowledge, prostration, rather than convulsion, was the prominent feature, and that they do not, therefore, correspond in their character to those described in *Fothergill and Want's Journal*, which, with some variation, were reproduced in some of the Irish Revivals.

Dr. Babington (lxix. p. 157) quotes from the third volume of the *Edinb. Med. and Surg. Journal* an account of a convulsive disorder in the Orkney and Shetland Islands, written about a century ago, from which an extract may be given here. "At first this distemper obtained in a private way, with one female, but she being seized in a public way at church, the distemper was communicated to others, but whether by the influence of Fear or Sympathy is not easy to determine. However this was, our public assemblies, especially at church, became greatly disturbed by their outcries." "When any violent passion seized them, or on a sudden surprise, they would all at once fall down, toss their arms about, twist their bodies into many odd shapes, crying out all the while most dismally, throwing their heads about from side to side, with their eyes fixed and staring." "Few men are troubled with this distemper, which seems more confined to women, but there are instances of its seizing men, and girls of six years of age. With respect to the nature of this disease, people who have made inquiry differ, but most imagine it hysterical; however, this seems not entirely the case, as men and children are subject to it; moreover, it is a new disease in Shetland, but when imported none can imagine. . . . In Northmaven a cure is said to have been effected by a very singular remedy, which, if true, and there seems no reason to doubt it, shows the influence of natural causes in removing, as well as inducing con-

vulsive disorders." Dr. Babington adds "the cure is attributed to a rough fellow of a Kirk officer, who tossed a woman in that state, with whom he had been frequently troubled, into a ditch of water. She was never known to have the disease afterwards, and others dreaded the same treatment."

That emotional disturbance can produce hysterical movements and other symptoms in the male sex, and not only so, but without any connection with the development or disturbance of the reproductive organs, is well illustrated by the following case, reported by Dr. Wilks (xlv., March 13, 1869):

"Some months ago I received an urgent message to visit a gentleman, a short distance from town; when I arrived at his house he was sitting in his parlor, and not looking ill. I expressed some little vexation at being summoned so hastily. He said he was now much better, and commenced explaining to me the reason of the summons, when he began to cry; presently the cry reached the stage of sobbing; this became louder and louder, and more violent, until it changed into a laugh, which he was totally unable to suppress, and I became a witness of the most marked attack of hysterics that I had ever seen in either sex. He presently fell back in the chair, quite exhausted. He was a man thirty years of age, with a large black beard, and had as manly an appearance as you would wish to see. His wife then told me that he had been speculating, that he was a ruined man, and would have to leave his house and family. He had returned home that evening shortly before I was sent for, and the thought of the prospect before him was more than he could bear, and thus the cause of the attack. Whilst she was relating this, he grew calm, and then commenced to talk to me, saying how foolish he was, but could not refrain from referring to the circumstance of his misfortune. He had not proceeded far when he was again overcome; another laugh commenced, and then he broke out into such a loud and involuntary fit of laughter, that the noise could be heard throughout the whole house. It only ended with his utter exhaustion. I saw him a few days afterwards, and he was pretty well. This gentleman had simply a hysterical attack from violent emotion."

The great importance of distinguishing between the hysterical counterfeits of disease, and forms of disease involving more or less structural change, has been already referred to. Only the

other day a case of convulsions, which was pronounced to be hysterical by Trousseau, was regarded by Dr. Handfield Jones as undoubtedly epileptic. The fact is, the diagnosis can often be certainly made only when the case has issued either in recovery or death, for the strongest diagnostic sign is that the symptoms of hysteria, however alarming, whether resembling coma, convulsions, tetanus, or paralysis, do not tend to endanger life or prove permanent; at least in these forms, for they may end in insanity. Emotional excitement, acting centrally, induces an imitation of the corresponding diseases originating in organic change, just as can at any time be induced by Braidism in susceptible subjects. It has this feature in common with all functional affections; that it is a disorder which may quickly come and as quickly go, demanding a treatment and admitting of a prognosis wholly different from those called for in disorders involving structural changes.

A good example of spasm of the eyelids of mental origin is recorded by Dr. Weir Mitchell. It occurred in a lady, shy from childhood, blushing easily, and excessively embarrassed by the presence of strangers. "The trouble of her eyes came on for the first time at a watering-place. When going to dinner and sitting down, she observed that a great number of persons were looking at her as a last arrival. She mentioned the fact to her husband and was almost immediately attacked by a violent closure of the eyes, and was obliged to be led in this condition from the table. When this had happened once, you may well imagine that every repetition of the original cause brought back a return of the disorder, until at last it was quite impossible for her to go to table in the room with other people. You will see that in this case Emotion and, after the establishment of the symptoms, the despotic control of an unpleasant memory were competent to create and then to continue this grave inconvenience. I succeeded in inducing her, however, to make an effort to go to dinner without regard to what happened, and to face the slight unpleasantness and the talk which her appearance might create. Her courage was finally rewarded by a cure which was perfected, so to speak, by a long absence in Europe, and constant exposure to the very difficulties which had given rise to her first attacks" (xcix. p. 125). It should also be added that the lady had over-studied.

In another case related by the same physician, a girl of thirteen, began to limp after an attack of ague; hip-joint disease was diagnosed by the travelling agent of a surgical institute, where she was treated, grew worse, and "under the influence of the discussions as to the hip-joint disease and its symptoms," the right leg became contracted at the knee and hip. Both hips suffered, and splints were applied. The arms also became flexed, the feet being extended, while the eyelids closed and remained spasmodically shut. Judicious treatment was adopted. The legs were forcibly straightened, and by this and other means the contractions and spasms were removed (xcix. p. 81).

From our present standpoint, a purely emotional one, we have only to admit that if a powerful emotion be aroused, whether from without or from within, it may discharge itself through the sensori-motor ganglia upon any of the nerves and muscles of the frame, so as to cause tonic or clonic spasms—the globus hystericus being the natural sequel of irritation of the medulla at the point of origin of the vagus or accessory. Should the emotion, however, by its action on the vaso-motor nerves, violently contract or dilate a feeble or atheromatous vessel in the brain, or overstrain the nerve-tissue itself, serious and fatal organic changes may follow, and such cases are at once understood to belong to the non-hysterical class. When we see two cases of hydrophobia—one caused by actual virus, the other by emotion—it is easy to understand (and can be practically demonstrated by Braidism) how the latter is but the reflection of an image of the real disease intensified by Fear, and that the symptoms may pass away when the image is removed from the mind, but otherwise may prove fatal. So of chorea: we can see that an affection of the cardiac valves which causes embolism and consequent chorea, although producing the same muscular movements, involves a very different physical condition from that which obtains in chorea of emotional origin. There may or may not be symptoms in combination with it, which warrant our reference of these cases to hysteric excitability.

Whenever the emotions master the Will, the muscles are liable to spasm; when voluntary power is first embarrassed, and while the struggle is maintained, muscular *tremors* occur. It is afterwards, when the Will is subdued, that various spasmodic movements take place. In reference to the tremor constantly witnessed

as the result of Fear and Joy, and consistent with health, it is unnecessary to do more than to state the fact, and pass on to the serious pathological condition marked by tremor, and frequently produced by emotional states.

Trembling Palsy, Paralysis Agitans.—Medical experience fully confirms the remark of Marshall Hall, that by far the most common cause of the accession and of the aggravation of paralysis agitans, is Emotion; hence during sleep the movements are calmed. Hall cites the case of the Abbé —, who, during the reign of terror in France, was seized by the mob with cries of “à la lanterne!” He escaped, “but he was ever afterwards subject to violent tremor of the limbs.” Also that of a gentleman in whom the disease was induced by the mental anxiety occasioned by a ruinously expensive parliamentary election. He was unable to walk alone, but walked very well “if his wife gave him her hand in the gentlest manner.” The loss of power over his muscles was complete when anything occurred to excite agitation or emotion. In a third case, the disorder also originated in anxiety about money; and the son of this patient being entrusted with a large sum of money to convey to a bank, and delaying his return by going to the theatre, was the cause of a great aggravation of the symptoms, almost amounting to hemiplegia. M. Hall, who speaks of paralysis agitans as euphatically “a disease of emotion,” adds that he could adduce many examples of the same kind as the above (xvii. p. 23).

A case of paralysis agitans, under Oppolzer, is an excellent illustration of the disorder:

The patient, a man, æt. 60, happened, during the bombardment of Vienna, in 1848, to get in the midst of the fight. He was struck with such terror that he could not return home by himself, and had to be taken there. He had scarcely got over his fright when a bomb burst near his house and alarmed him again. A few hours afterwards, on trying to take some food, he found himself perfectly unable to use his hands, because as soon as he tried to move them, they began immediately to tremble violently. He noticed also after a short time that his lower limbs trembled in the same manner, but less violently, so that he could still walk. The disease not only resisted all the measures employed against it, but also grew gradually worse. The trembling persisted even when he lay down; and involved other muscles; lastly, paralysis

was superadded to it. After a few years he became incapable of standing erect, and as soon as he made the attempt, he had an irresistible tendency to fall forwards; so that in order to avoid falling down, he was obliged to lay hold of neighboring objects, or to walk hurriedly. The keenness of his senses and of his intellectual faculties had diminished slowly but progressively. Twelve years after the fright he fell down in a fit, and was unable to rise, though not unconscious, and a few weeks after was admitted into the Hospital, under Professor Oppolzer, from whose observations Trousseau gives the particulars. On admission the muscles of the face, neck, and upper limbs were affected with violent trembling, only suspended during sleep. The tremulous muscles were at the same time rigid. His strength rapidly diminished; he had severe convulsive seizures, and he died three weeks after admission. A *post-mortem* examination revealed, among other appearances of less importance, very decided induration of the *pons Varolii* and the *medulla oblongata*. The spinal cord was firm and the medullary substance of the lateral columns, principally in the lumbar region, presented opaque gray striæ. On making a microscopical examination, there was found in the substance of the *pons Varolii* and *medulla oblongata* an abnormal production of connective tissue, accounting for the induration of those parts. The opaque striæ in the lateral columns of the cord were due to the presence of connective tissue in process of development. In the substance of the *right optic thalamus* there was an apoplectic cyst of the size of a small bean, the walls of which contained pigment. (For the case in full, see *liv.*, I. pp. 446-9.)

In another case of paralysis agitans, reported by the same physician, the disorder originated in "deep emotions:"

The patient, an advocate, had attended his wife assiduously for a twelvemonth before her death. Grief and sleepless nights had exhausted him. Such nervous irritability followed that he could not bear to hear the ringing of bells, or the least noise. He soon observed that his arm seemed to shake slightly, and that the movements of the whole limb, but of the hand especially, became more and more difficult. In a short time the leg on the same side became affected also, and his symptoms grew worse, without being at all benefited by treatment. After a time he had to give up writing. Trousseau remarks that the patient looked like a

paralytic, but on examining him carefully, it was soon made clear that the paralysis was only apparent (liv. p. 442).

CHOREA.—Of spasmodic affections, we will now take chorea to illustrate the influence of the emotions upon the nervous and muscular systems. Emotion may so injuriously affect the nervous system that the Will can no longer direct or control the muscles, which then become the sport of the sensori-motor apparatus.

Emotional excitement may not only originate the disorder, but when once established, whether arising from this or another cause, may induce or aggravate the spasmodic twitches which characterize the disease.

Trousseau puts the practitioner on his guard against exaggerating the gravity of a case of chorea, seen by him for the first time, inasmuch as the emotion occasioned by a stranger increases the violence of the convulsions, however the disorder may have originated.

In the *Medico-Chirurgical Review*, July, 1863 (p. 492), Dr. Peacock insists upon the fact that the most frequent exciting causes of chorea are more or less violent emotions, Fear, Grief, excessive Joy, etc., and that hence it is common among females. In the cases which he analyzes, the emotional causation was traced in 38.7 per cent. of the total number. Dr. Angel Money has found in analyzing 214 cases of chorea that fright alone was the cause of the attack in 60 instances, or 28 per cent. (liv., Jan. 1883, p. 513).

One of the worst cases of chorea I have seen was caused by fright in consequence of a fire in the house in which the patient, a woman, lived.

Dr. Todd gives the case of a boy, æt. 9, thin, but otherwise healthy looking, who, a day or two before the symptoms appeared, was much frightened by his sister, who had covered herself with a white sheet and appeared before him unexpectedly while he was in bed. "There is here then," observes Dr. Todd, "that which we so frequently—indeed, I might say, so constantly—observe, namely, the connection of sudden fright with the origin of these cases. . . . Although a certain diathesis seems to be always present in cases of chorea, the disease seldom occurs without some sudden emotional excitement, such as fright." None of this boy's family had been similarly affected, but there was a lency to rheumatic complaints, and the patient himself had

been attacked with rheumatic fever (giving rise to endocarditis) ten weeks before admission, and two months before the appearance of the choreic symptoms, which came on suddenly. The boy went to bed as well as usual, but in the morning, when his mother went to give him his breakfast, she was surprised to find that he could not hold his cup, and that he was quite helpless. He had lost the power of directing his movements properly; the motions of his limbs were exaggerated and ungovernable, and if he attempted to take hold of anything, his arm appeared to be violently jerked, in the right direction perhaps, but usually beyond the object of his search, as if by some power over which he had no control. Among the early symptoms which manifested themselves in this way was difficulty of deglutition, which came on and continued for some days prior to the more common and characteristic symptoms. The dysphagia was due partly to the want of full contracting power over the tongue, and partly to a want of due harmony in the action of the pharyngeal muscles. This symptom is peculiarly interesting, from the marked connection which subsists between this malady and emotional excitement. The treatment of this boy consisted of splashing him with cold water every morning, and at the same time feeding him well. He improved much in general nutrition, the irregular movements diminished, and when the report was made—eighteen days after admission—he was able to walk without assistance.

Two other cases of emotional origin are given by Dr. Todd—one a girl, *æt.* 14, with a history of rheumatic fever when two and a half years old, who was met and accosted about three weeks before the appearance of the symptoms by a drunken man, and was very much alarmed at the time. On this case Dr. Todd remarks that, although the interval seems very long, "I think we may fairly refer the excitement of the disease to this cause; in many instances, indeed, even longer periods have elapsed between the fright and the accession of the malady. . . . I have known it to occur six weeks before the chorea manifested itself."

In the next case, the patient, *æt.* 12, a sister of the foregoing, was frightened by a drunken man, a few days after which she felt pain in the right arm and leg, and experienced a tingling in the fingers, which became restless and fidgety. Soon after, the left extremities became similarly affected; then came twitchings

in the face, and in the course of a fortnight from the time of the fright, irregular movements became general; she lost the power of standing or walking, and her articulation was almost completely destroyed. In both these cases, recovery followed the splashing treatment, succeeded by quinine and iron (lxxiii. p. 428-39).

Consistently with his views as to the special localization of emotion in the brain (see p. 146), Dr. Todd referred the seat of the disturbance in chorea to what he regarded as the emotional centre, and describes the sequence of phenomena thus: "First, a peculiar diathesis; then a more or less enfeebled nutrition; thirdly, a strong mental impression, which disturbs the centre of Emotion, and through it deranges the action of more or less of the nervous system, and of a corresponding portion of the muscular system" (l. c.).

Without adopting Dr. Todd's theory, it may be said that in cases of emotional chorea, violent mental excitement must have produced such a change in the nervous tissue, that the normally superior power of volitional over muscular movements was suspended or destroyed, and the sensori-motor apparatus left to its uncontrolled automatic action, or perhaps it would be more correct to say that the coördinating power is suspended, for automatic action is not necessarily spasmodic. As in epileptic and other convulsions, it is easier, however, to say from our knowledge of the physiology of the nervous system what part is in an abnormal condition than to determine in regard to vascularity and innervation in what it consists, and how it is brought about. Probably all we can say with certainty is that the shock which the brain receives from a violent emotion like Terror disturbs the normal relative nutrition and vascularity of the volitional and motorial centres.

Popular tumults are well known to have occasional attacks of this troublesome complaint. During the Bristol Riots of 1833, an excited imagination as to what might occur, acting through Fear, produced this result. Dr. Carpenter says that a remarkable number of cases were admitted into the infirmary there, within a few weeks afterwards. He also mentions a case in which any, even trifling, agitation of the feelings caused the most extraordinary contortions of the limbs and face. "This gentleman, a man of education and intelligence, of extreme benevo-

lence of character, and a mind habitually well regulated, can scarcely walk in the street without being liable to the induction of paroxysms of this kind by causes that could scarcely have been supposed capable of thus operating. For example, he was one day seized by one of these attacks in consequence of seeing a man miss his footing (as he thought) in descending from the top of an omnibus; and the pleasurable excitement of meeting a friend usually induces the same result. The tendency varies very considerably in its degree, according to the general condition of his health" (viii. p. 791).

In a case, that of a girl, *æt.* 18, reported by Trousseau, and denominated "hysterical," the cause was fright. She stammered in a singular manner, repeating with extraordinary volubility, and for a pretty long time without stopping, the last syllables of the word she attempted to say, articulating the first syllables with difficulty. It was a remarkable fact, however, that she did not stutter when she sang, and no modification of speech could then be suspected (*liv.*, i. p. 434). In a second case, the cause was intense grief from the death of a sister. The patient was a lady, *æt.* 19. Strange convulsive movements of the head and upper limbs were the most prominent symptoms. When Trousseau saw her, her aspect was that of perfect health, but her whole left side was the seat of violent choreic movements, so that she was in danger of hurting herself against the furniture. An attempt to arrest them by taking hold of her hand made them worse: there was one means, however, of quieting all this agitation as if by magic—namely, the piano. She could spend an hour or two at the instrument, playing to perfection, and with the greatest regularity, in excellent time, and without missing a note. This single fact would have been sufficient in Trousseau's opinion to show, in the absence of other proofs, that this was an example of hysterical chorea, and not genuine St. Vitus's dance. When she wished to seize an object, she could do so at once, and would never drop it (p. 434).

Recently (1882) the author saw in St. Thomas's Hospital, under Dr. Bristowe, a girl with right hemichorea, due to the alarm experienced on being galvanized.

We pass on now from well-marked cases of chorea to a few other examples of spasm, more or less nearly allied to it. Fear, in the form of a vivid dream, has produced spasmodic action of

the muscles. The case of a peasant is related by Tissot, who, having dreamed that a snake had coiled itself around his arms, started out of sleep much terrified, and was afterwards subject to spasmodic movement of the arm, sometimes lasting for an hour at the time, and returning frequently in the course of the day (lx.).

Dr. Althaus, in the *Medical Times and Gazette*, May 25, 1861, reports the case of a lady suffering from spasmodic contractions of the left trapezius and cleido-mastoid muscles, consequent upon a violent emotion excited by witnessing an accident in the street:

"At first the contractions were slight and only occurred when the patient was excited, when in society, or if spoken to. The affection gradually became stronger and more troublesome." There was no pain unless the contractions were unusually violent. Dr. A. says, "the influence of emotion in exciting the trembling and spasms of the muscles was most striking in this case. The patient said that she suffered far less when she was alone and if the room was darkened; but if she thought herself observed, and the object of wonder and pity, she became much worse; she had, therefore, almost retired from society, and was only with difficulty induced to leave her rooms, from which she used to shut out the light. It may be added that blisters and purgatives produced no—and valerianate of zinc but slight—benefit, while Faradization of the muscles and skin soon effected a complete cure, not a trace of the affection being observed, even when she was excited."

Dr. Althaus also gives the particulars of a case of the same disorder in a brewer, following and apparently due to the circumstance that when "driving, his horse fell and broke its neck, which gave him a great shock." He had also had much anxiety, but it ought in fairness to be mentioned that shortly before the attack he slept on a damp couch. He was benefited by the remedy employed in the last case, after calomel and laudanum, blisters and leeches had wholly failed to give relief. Dr. A. remarks, "In cases in which the emotional nature of the complaint is strikingly apparent, Faradization of the skin, which produces a powerful impression upon the nervous system, is preferable. If the influence of emotion is less marked, and the reflected muscles are only slightly rigid, while the nutrition of the corresponding muscles of the other side of the neck is impaired,

Faradization of the latter ought to be performed in order to restore the lost equilibrium."

The influence of emotion in causing spasm of the muscles of the *larynx and glottis* ("asthma thymicum"), is well illustrated by the following case, from the *Annales Médico-psychologiques*, 1849, p. 450:

Marie Meyer lost her child, eight months old, to whom she was greatly attached. The grief this circumstance occasioned, produced a painful sense of constriction in the larynx. Emotion of any kind at once aggravated it, causing great difficulty of breathing. One one occasion, for two hours, the attack was so violent that she was blue in the face, speechless, scarcely conscious, and, in fact, all but suffocated. On the following day she was admitted into the Hôtel Dieu, Lyons, under Dr. Lavirotte's care, after having suffered from her malady for seven months. She only remained in the hospital about three weeks, during which she was very simply treated, and left relieved, but not cured.

Trousseau, after observing that laryngismus stridulus generally comes on "under the influence of some mental emotion or of a fright," adds, "I was once consulted for a little boy, who, from the beginning to the end of his first dentition, was subject to such seizures. He was of a very excitable temperament, and the least annoyance brought on an attack" (liv., i. p. 356).

Paroxysms of *cough* of a hysterical character are often, as is well known, caused by depressing emotions, but it is not so well known that apparently hysterical cough may accompany and mask really organic cerebral disease. In three of such cases reported by Dr. Stokes, there was evidence of meningitis, in one case by post-mortem examination, and in the other cases by very suspicious symptoms. "It is a curious fact," he says, "that in three of the most extraordinary cases of hysteric or nervous coughs which I have witnessed, there was evidence of such an occurrence." (*Treatise on Diseases of the Chest*, p. 266.)

SINGULTUS.—An obstinate case, the result of Emotion, is reported by Romberg (xxxiv.). A Polish Jewess, æt. 21, had a violent fright at the first outbreak of the Cracow revolution, and suffered from hiccough in consequence. Three years afterwards she was admitted into the Polyclinique, at Berlin. Owing to a complication with spasm of the glottis it was particularly loud

and sonorous. A spasmodic throwing back of the head, during each attack, showed the participation of other nerves than those involved in hiccough. There was tenderness of the epigastrium and of the spinous processes of the lower cervical and upper dorsal vertebræ, leucorrhœa, with regular menstruation. All the remedies previously tried had been ineffectual. It is not stated whether the treatment at the Polyclinique proved more successful.

Yawning is produced by sympathy rather than direct emotional influence. Spasmodic laughter (*risus convulsivus*) may arise in both ways, but I am not acquainted with any case of psychical origin in which it assumed a serious form. In a fatal case of physical origin, in which this was a prominent symptom, the medulla oblongata was found to be the principal seat of disease.

Vocal spasms (*stammering* and *stuttering*) are constantly aggravated by bashfulness, while the courage excited by an emergency may remove them, as happened with Charles I., who, though a stammerer, is said to have been entirely free from the affection when he spoke at his trial. "Stammering," Marshall Hall observes, "would scarcely exist without emotion," and he likens it to the nervous tremor which often renders it almost impossible for some persons to sign their names in public. I have not been able to ascertain that any cases of permanent stammering have owned emotional excitement as their original cause.

PERTUSSIS.—Among the exciting causes of whooping-cough, the emotions are well known to play a considerable part. Romberg specially mentions vexation and alarm.

SPASM OF PHARYNX; HYDROPHOBIA.—Spasmodic contractions of the muscles of the pharynx have been frequently caused by fear, chiefly connected with the idea of hydrophobia. Such cases illustrate the remarkable influence exerted upon the body by what is popularly understood as the Imagination. It is so frequently associated with an emotion, and owes so much of its force to this element, that it is, as we have before had occasion to observe, often impossible to separate them and study the action of the Imagination, regarded as the purely intellectual faculty of *imaging*. In the following cases it is evident that the emotion of Fear caused the symptoms:

Romberg cites from Chomel the case of a physician at Lyons, "who assisted in the dissection of several hydrophobic patients,

and was seized with the conviction that he had been inoculated with the virus. He lost his appetite and was sleepless; when he attempted to drink he was seized with choking and spasm of the pharynx; for three days he wandered about the streets in a state of despair till at last his friends succeeded in convincing him that his malady had its foundation in his mind" (xxxiv., I. p. 183). Trousseau says he has known physicians—men of strong minds and courage—who, although well aware of the conditions needed for the development of rabies, were subject for several months and even years after attending and dissecting persons suffering from hydrophobia, to more or less distressing attacks of dysphagia, on the mere recollection of the awful scenes which they had witnessed. "Time alone got rid of their nervous susceptibility which manifested itself in the shape of spasm of the pharynx, and they cured themselves of it by appealing to their knowledge of the disease and by forcing themselves to drink some liquid whenever they felt the sensation coming on" (liv., i. p. 692). It may here be observed that, according to this physician, there is in nervous hydrophobia dysphagia only, and no general convulsions, the spasm affecting the pharynx alone, while the respiration is unaffected. If the dysphagia extends beyond four days, the strong probability is that the disorder is not due to any virus, but solely to the Imagination.

Rush wrote an able essay (and when are his essays not able?) on hydrophobia, in which he assigns an important rôle to the influence of "Fear" and "an involuntary association of ideas." He affirms, undoubtingly, that cases of spontaneous hydrophobia have arisen from these causes.

It is probable that persons who have been attacked with hydrophobic symptoms after the bite of a dog doubtfully mad, have suffered from the fearful anticipation of the disease only, and not from any canine virus; the inference drawn in such cases, that the animal is laboring under the disease, being too hasty. When a wound has been inflicted by a really rabid animal and no effects have followed until many months after, emotional excitement may be the occasion of the outbreak of the symptoms, especially should it be in the form of Fear, and should "the nerves" at the time be in a susceptible state. As Dr. Rush graphically expresses it, the man's fears are then *let loose upon his system* and rapidly produce a dread of water which appears to be wholly unconnected

with the previous bite. "It is of no consequence whether the dread of water be the effect of the saliva of a rabid animal acting upon the fauces, or of a morbid excitement determined to those parts by any other stimulus" (lxi., ii. p. 203).

Romberg cites a case from Trollet in which mental emotions excited the disease, three months and a half after the bite had been received. Up to that time the patient had been leading a very quiet life, but after yielding to excesses at a fair, he was in returning met by a dog which suddenly attacked his horse. Then all the details of his own former accident recurred to his mind; a few days after hydrophobia made its appearance, and carried him off on the third day (xxxiv., ii. p. 145).

The Memoirs of the Royal Society of Sciences of Montpellier, contain a history of two brothers bitten by a mad dog, one of whom went to Holland, and did not return for ten years. Learning on his return that his brother had died from hydrophobia, he was seized with hydrophobic symptoms himself, and died (lx. p. 143).

Chomel held that in such cases it is highly improbable that the original virus causes the attack after the lapse of so many years, and that it is much more reasonable to refer it "to the well-demonstrated influence of the Imagination in the production of rabiform hydrophobia." When admitting that spontaneous hydrophobia might end fatally, he regarded all cases of hydrophobia, terminating in recovery, as originating in causes independent of the virus. Trousseau is inclined to limit the influence of the virus to a period of about twelve months; all cases occurring subsequently being more probably due to Imagination and Fear.

Emotional excitement not related in any way to the disorder appears able to develop an attack, if the virus is latent in the system. A few months ago a painful case of this kind was reported in the *Daily Telegraph* as occurring in the United States, of which the following is a condensed account: A young woman went into her father's farmyard to kill chickens. One of the birds was picked up by the house dog, which ran off with it, and on being pursued by the girl bit her frightfully, lacerating the arm. Her mother and brother, who came to her assistance, were also severely bitten. The wounds of all three, nevertheless, healed in the course of time, and the matter had been almost forgotten, pushed out of memory indeed by a much more interesting event

—the approaching marriage of the girl. All went on well for about two months, till the wedding morning, when the mental excitement brought on a shiver at the sight of water when she was about to wash, followed by other symptoms of a hydrophobic character. Although the symptoms were so alarming, she went through the ceremony; but scarcely was it over when she was seized with spasms, and, after a rapid succession of paroxysms, died in her husband's arms.

Copland cites from Pinel the case of a soldier alarmed at midnight by his comrades, who was immediately attacked with convulsions, burning and constriction of the throat, dread of liquids, and expectoration of a copious frothy saliva. "He was certain that he was never bitten by any animal. The symptoms increased and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat" (lxx., Art. "Rabies").

Quite recently (xlv., June 18, 1870) Dr. Finlay has reported a case of nervous hydrophobia occurring in a boy of 12, "produced simply by mental anxiety and terror:"

In the beginning of the year he was bitten by a small terrier on the left leg. The wound was slight, and healed without difficulty. No ill effects were observed, as regards the bite, for two months, but in the interval he complained of pains in the chest, and spat blood, for which he attended the Brompton Hospital. In the beginning of March he complained of severe pain in the leg, at and about the bitten part, at first stationary, but afterwards it assumed the form of an epileptic *aura*. He described this sensation as a peculiar creeping pain, which progressed gradually to the heart, having reached which, insensibility occurred, accompanied occasionally by twitching movements of the extremities and of the muscles of the neck and face. Bromide of potassium was ordered. A week afterwards he said that after the *aura* had crept up to the abdomen, he felt as if the dog that had bitten him was in his inside scratching violently; while during the fit he barked, and his expression was wild, fierce, and haggard. Salivation marked the close of the fit. Next day he attempted to bite and scratch all within his reach, and in many respects imitated the actions and gestures of a dog. Sometimes, *e. g.*, he would seize the pillow with his teeth, growling the while as a dog does with a rat. Occasionally he refused food, unless

allowed to lap it, while, when threatened with a whipping if he would not stop barking and biting, he would turn round and whine as a dog does when struck. On the tenth day the symptoms were aggravated, and the saliva at times thick and glutinous. As he had not slept for two nights he was ordered chloral, and continued the bromide. Two hours' sleep followed the second dose of chloral. Next day the lad was very violent, and in the evening was with difficulty restrained, the barking and howling being loud enough to be heard in the street. Pulse rapid and weak. After taking thirty grains of chloral he slept seven hours, but was more violent than ever after he woke. When presented with another dose of chloral, he became violently convulsed at the sight of the glass. Similar convulsions were produced by showing him wine, water, etc.; in fact, he refused all fluids. Dr. Finlay attributes this refusal simply to a suspicion that the chloral would be thrust on him in some other mixture. The bromide appeared now to have most influence upon the fits, and at the end of a fortnight from the commencement of the attacks, the fits were only occasional, *but yet he sometimes barked during sleep*. The patient was now removed to St. Mary's Hospital, where he soon completely recovered under the care of Dr. Handfield Jones.

To the foregoing it should be added that the dog appeared to show no signs of rabies, but as the boy constantly asserted that he could not recover until he saw the dog dead, it was decided to kill it. Difficulties, however, were thrown in the way, and it was not until some weeks had elapsed, and the boy had quite recovered, that the matter was decided in court, nor is it stated whether the dog was ultimately destroyed. Dr. Finlay is decidedly of opinion that the bite in itself was innocuous, and that the boy's symptoms were referable to the "Imagination, wrought upon by intense mental excitement and overpowering Fear, conjuring up all the horrors of the actual disease, till some of its peculiar effects were in reality produced."

Sometimes there is, properly speaking, no spasm whatever of the pharynx, and there is little more than a delusion present—a hydrophobia-phobia. It is rather the effect of the action of mind upon mind, than what I intend to convey by the action of the mind upon the body.

Trousseau records several cases of imaginary hydrophobia of

this kind. In one, a very mild example, a dog which had bitten a good many beasts that had died of rabies, tried to bite the arm of a gentleman. A few months afterwards he suddenly exclaimed, at breakfast, that he was seized with hydrophobia, for he could not swallow either fluids or solids. He was already beginning to rave, when his wife, who only believed that he had eaten too much, persuaded him to induce vomiting by tickling his throat with his fingers. The *malade imaginaire* was relieved, and no more was said about rabies. We need not suppose that here there was even spasm of the pharyngeal muscles; an extra large breakfast (after fasting in Lent) half choked the poor fellow, who at once recalled the mad dog, and referred the symptoms to a wrong cause.

In another case a judge was out riding with his dog; they met a flock of sheep, and the dog bit those which he could catch, and, although he obeyed his master's call, had a strange aspect. He then bit dogs and oxen, swam across a river, and a few hours afterwards died. Shortly after, the judge heard that many of the beasts bitten by the dog had died of rabies. He was alarmed, because he remembered that on the same day the dog had licked his hand several times, and he now found some scars upon it. Seized with terror, he no longer dared to touch water, or to shave himself, and fully believed he had hydrophobia. A medical man tried, in vain, to calm his fears; for several days he was excited and delirious. At last, being told over and over again that persons seized with rabies died very rapidly, and that he could not, therefore, be rabid, since his dread of water dated already ten days back, he allowed himself to be persuaded, and his dread of water vanished (liv., i. p. 691-2).

So evident is the influence of the Imagination in the development of hydrophobia, that some distinguished medical professors have, as is well known, gone so far as to maintain that it is always due to this cause. The strange tendency which exists among many reasoners, when investigating the causes of morbid phenomena, to range themselves under one of two exclusive extremes—the first attributing *nothing*, and the last *everything*, to the Imagination—is strikingly exhibited here. Bosquillon, a Professor of Medicine, and Physician to the Hôtel Dieu, was utterly sceptical as to the existence of any virus, and from his observations in that hospital, came to regard the patients admitted for

hydrophobia as "nervous" and fanciful. That they died was, he most justly held, no proof that the disorder was not imaginary, for the Imagination is, as we see, a psychical virus itself, which can and does frequently kill. Professor Dick, of Edinburgh, held that hydrophobia in man "is not the result of any poison introduced into his system, but merely the melancholy and often fatal results of panic, fear, and of the disordered state of the Imagination." "Those," he adds, "who are acquainted with the effects of sympathy and irritation, and panic, in the production of nervous disorders, will readily apprehend our meaning, and if our view be correct, the immense importance of disabusing the public mind on the subject is apparent" (lxii., i. p. 367).

The advocates of this view supported their position by such facts as these: The existence of any virus has never been demonstrated. The assertion of Wright, Eberle, Hunefeld, and others, that the saliva of rabid animals and angry people will, if injected into the blood, produce hydrophobia, is denied by a great chemical authority, Lehmann. As the same cause ought to produce the same effect, and as the bite of dogs regarded as mad is sometimes followed by no symptoms whatever, while the belief that a bite has been received is alone sufficient to cause all the symptoms, it was alleged that it is illogical to attribute them to any virus. The period of incubation, again, is altogether uncertain, differing in this respect from smallpox, etc., and apparently depending upon the strength of the Imagination in the individual. The good effects of cauterization are, it was said, more likely to be due to the distraction of the attention to a painful sensation, and to the definite hope inspired by vigorous treatment, than to the destruction of a poison which must have already entered the circulation and commenced its deadly work. The benefit derived from the diversion of the patient's mind by music, as recommended by Desault, and from various superstitious practices, countenanced this theory. Lastly, as Demangeon observes, "if the hydrophobic virus has any existence, which to me seems highly problematical, it must be admitted that its effects do not differ in a single characteristic sign from those of the Imagination and certain inflammations of the brain and throat, and it is indisputable that it is often sufficient to calm the Imagination, and adopt an antiphlogistic course of treatment to stop the development of the disease" (lx.).

Whatever force, however, there may be in these arguments to favor the relegation of hydrophobia to the domain of the Imagination, few, if any, will now be hardy enough to deny an actual material virus and a genuine, as distinguished from a nervous, hydrophobia. That such grave doubts should have been started is in itself a sufficient proof of the remarkable power exercised by the definite mental imagery of a particular disease, intensified by fear. Elliotson considered that the great distinction between real and imaginary rabies lay in this: that in the latter the fear of swallowing only is complained of, that there is no morbid irritability of the surface to the impression of air, and that there is no sudden catching of the breath.

Dr. Copland admits that it is "not impossible" that true rabies may be produced by mental influence, independently of the operation of an inoculated virus; but he does not allow that spasmodic symptoms, with a difficulty of swallowing, or even a dread of water—a *hydrophobia*—are sufficient proofs of the presence of a disease identical with that which the bite of a mad animal causes. I think, however, it must be admitted that the approximation to identity is as great as can be expected from the operation of a physical agent in the one case, and a psychical one in the other.

The region of the cerebro-spinal axis morbidly affected in rabies, is generally regarded as the medulla oblongata. Sch. v. d. Kolk cites with approval the observation of Romberg, that the corpora olivaria are very highly injected in hydrophobia. Pathological research has, since the first edition of this work, discovered unquestionable lesions (congestion and leucocytes), but these are not peculiar to hydrophobia. The cerebral hemispheres are obviously often involved. Among the admitted difficulties attaching to the pathology of this disease, that is surely not the greatest which acknowledges the power of the Imagination, in combination with Fear, to excite not only a paroxysm in the course of the disorder, but to originate a group of symptoms, by central excitation, which in a susceptible state of the nervous system closely resemble those of genuine rabies, and may terminate in death.

I have said nothing in the foregoing remarks of the terrible emotions which in genuine hydrophobia afflict the patient, and which, although not the cause, but the effect of the disorder, are at least in their turn the apparent cause of many of the symptoms.

One of Dr. Bardsley's patients "fixed his eyes with horror and affright on some ideal object, and then, with a sudden and violent emotion, buried his head underneath the bedclothes." Dr. B. inquired the cause. He eagerly asked if the doctor had not heard "howlings and scratchings?" On being answered in the negative, he suddenly threw himself on his knees, extending his arms in a defensive posture, and forcibly throwing back his head and body. The muscles of the face were agitated by various spasmodic contortions, his eyeballs glared and seemed ready to start from their sockets, and at that moment, when crying out in an agonizing tone, "Do you not see that black dog?" his countenance and attitude exhibited the most dreadful picture of complicated horror, distress, and rage, that words can describe or imagination paint (lxx. p. 247-8).

Lawrence thus graphically refers to the Imagination as the immediately preceding cause of symptoms in the course of the disease. "The patient is pursued by a thousand phantoms that intrude themselves upon his mind; he holds conversations with imaginary persons; he fancies himself surrounded with difficulties, and in the greatest distress. These thoughts seem to pass through his mind with wonderful rapidity, and to keep him in a state of the greatest distress, unless he is quickly spoken to or addressed by his name, and *then, in a moment*, the charm is broken; every phantom of imagination disappears, and at once he begins to talk as calmly and connectedly as in perfect health" (lxii., i. p. 370). Here we see the higher or ideational centres primarily deranged, and the sensori-motor apparatus excited secondarily. Theoretically, there is no reason why the former should not be spontaneously the source of such dreadful mental images as to cause all the foregoing symptoms. That the disease may be spontaneous is, says Chelius, "beyond doubt." Why not, then, from Imagination and Fear?

TETANOID CONVULSIONS.—A good example of opisthotonos, the effect of a violent impression upon the feelings, has already been given among the cases met with in the Irish Revivals. In this case clonic convulsions were also present. In another case, a poor girl, æt. 7, "without the slightest appearance of any previous agitation or uneasiness of manner, was struck prostrate in a single moment. For a short time her body was found to be perfectly rigid, and her face colorless." Those who know how such a con-

dition of the muscles can be artificially induced, will not be surprised to find it said that "the eyes presented an enigmatical phenomenon beyond the power of philosophical reasoning to expound," and that there was a "long, breathless, and unwavering gaze."

This condition, which lasted about an hour, illustrates a state of transient but intense rigidity, which is truly tetanic in its character, however trivial it may seem when contrasted with ordinary tetanus—a disease, whether traumatic or idiopathic, which is certainly a much more formidable affair than anything that is usually witnessed as the result of emotional excitement. *Hystero-tetanus* mostly affords examples in point. Dr. Carpenter records a case of hysteria, accompanied by a tetanic condition of the muscles, which may fairly be adduced here in illustration of the action of certain emotional states upon the motor system, the exciting cause of the disorder being the disappointment of the affections, preceded by anxiety and excessive mental exertion.

"Complete opisthotonos coexisted with perfect coma; . . . then again there was trismus, lasting for five consecutive days, without any other spasmodic action or loss of sensibility; this sometimes alternated with fits of yawning, in which the jaw was held open for half an hour together; at another period the convulsions had more of the epileptic character, the face being distorted, and the limbs agitated, concurrently with a state of coma, but without laryngismus; with this alternated fits of laryngismus, without insensibility, and occurring during the expiratory movement; whilst, during the whole of this succession, there was paralysis of the extensor muscles of both lower extremities, with paroxysms of the most violent and prolonged cramp in one of them" (viii. p. 879).

CATALEPSY.—The occurrence of this disorder is rare from any cause, excluding the cataleptic phenomena which are often induced artificially by Braidism.

I have not now in view the cases of mental disorder in which the limbs assume a more or less cataleptic form. Were I to include these under the term catalepsy—and no doubt they are closely allied—I could instance patients who were thrown into a condition of mental stupor, with cataleptic symptoms, by mental shock.

Dr. Crichton has recorded in his work the following case, from

Bonetus, under "Catalepsy:" "George Grokatzki, a Polish soldier, deserted from his regiment in the harvest of the year 1677. He was discovered, a few days afterwards, drinking and making merry in a common alehouse. The moment he was apprehended he was so much terrified that he gave a loud shriek, and immediately was deprived of the power of speech; when brought to a court-martial, it was impossible to make him articulate a word; nay, he then became as immovable as a statue, and appeared not to be conscious of anything which was going forward. In the prison to which he was conducted he neither ate nor drank. The officers and the priests at first threatened him, and afterwards endeavored to soothe and calm him; but all their efforts were in vain. He remained senseless and immovable. His irons were struck off and he was taken out of the prison, but he did not move. Twenty days and nights were passed in this way, during which he took no kind of nourishment, nor had any natural evacuation, but then gradually sank and died" (lxiii., ii. p. 24). It is to be regretted that more particulars are not given in regard to the muscular system.

Among the causes of cataleptic seizures Copland enumerates the following predisposing and exciting ones, namely, among the former, violent and continued sorrow, great anxiety, unrequited affection, intense and sustained mental applications, and religious contemplations; and among the latter, some violent mental impressions, religious enthusiasm, the passion of love, fright, terror, or uncommon dread, concealed mental emotions, and ungratified passions (lxx., Art. "Catalepsy"). After observing that he has had several opportunities of examining the phenomena of catalepsy from the commencement to the cessation of the attack, he says: "It is very remarkable how instantly a female, subject to catalepsy, is seized with it upon being startled or affected suddenly and unexpectedly by any cause. The effect is as immediate as that produced by lightning, and although the power of motion is entirely and universally lost, yet sensibility is often but little impaired." (*Palsy and Apoplexy*, p. 229.)

Professor Lasègue states that he met in one year with ten cases, in a large practice among hysterical females. He found one class specially, if not exclusively, liable to this affection, those, namely, who were sluggish and more disposed to shed tears than be excited. "If one lays one's hands on their eyes, and closes the lids,

they feel a peculiar drowsiness, and presently pass into the deepest sleep, from which hardly any stimulus will arouse them. . . . The cataleptic rigidity is general or partial, complete or incomplete, more or less fugitive. It disappears as soon as the patient wakes." It is evident that Lasègue had by his manipulations produced a condition of the system similar to, if not identical with, well-known forms of hypnotism. "Two men passed into the state of cataleptic rigidity, as soon as any one closed their eyes. One fell into the deepest somnolence, the other did not sleep." Both died, but no morbid appearances were discovered. (*Biennial Retrospect* for 1865-6, New Syd. Soc., p. 119.)

Sauvages records in his *Nosologie* several striking examples of catalepsy:

In one case, that of a doctor's wife, the attacks were caused by the insulting conduct of a man; the limbs, the hand, and the fingers would preserve any position in which they were placed (vol. ii. p. 661).

In another case, that of a woman in the hospital of Montpellier, the cataleptic symptoms followed upon mental distress. When seated her arms and legs could be raised, and they would remain in this position without support. Both patients recovered. They were clearly cases of the same description as those shown at the Salpêtrière at the present day, but without the aid of hypnotism.

Section III.—Loss of Muscular Power: Paralysis.

GENERAL REMARKS.—In the last section we have seen the influence of the emotions in causing irritation of the sensori-motor centres, and the motor nerves, marked by the external signs of convulsive action of the muscles; in the present section we have to consider the effects of the same influence when it causes loss of function, indicated by muscular paralysis.

"Violent emotions of the mind" were enumerated by Aretæus among the causes of paralysis, and most medical writers have referred to them when treating of the etiology of this disease, or rather symptom of disease. They have not, however, always discriminated between the different pathological conditions which may accompany emotional paralysis. It is evident, however, that these conditions widely vary—that in some cases there is what is ordinarily understood as a functional derangement, merely, of the

motor centres, while in others, palpable organic changes take place, as when the rupture of a vessel occurs from the vascular excitement induced; and, again, the motor centres may be only apparently or secondarily affected, as in many cases of hysteria. Innumerable are the instances which show that the motor centres are frequently enfeebled by the abnormal play of emotion upon them, and that they are for a time really unable to respond to, at least, ordinary stimuli. An emotion may also be conceived to cause structural change in the higher centres of the encephalon.

Dr. Jackson's explanation of the effect of disease of a portion of the hemispheres upon the motor tract, consists in supposing that it induces disorder of the circulation in an arterial region, which includes the corpus striatum. That in this way the higher often affect injuriously the lower centres would seem highly probable.

It is easy to understand how, from Fright or sudden Joy, there may be a shock, more or less temporary, to the motor centres, by which some part is rendered unable to respond to the stimulus of the Will, or of ideas, or emotions, just as a man is sometimes deaf for days after firing a cannon, or is blind for a time after his eyes have been subjected to intense light.

In considering the changes which occur in the tissue of the brain and the vessels, the frequently felt difficulty of determining their order of sequence arises; but certainly when, from an overwhelming mental shock, a man becomes paralyzed, it seems most natural to conclude that the first event in the series is a change in the normal condition—the molecular arrangement—of some portion of the brain-tissue, which is transmitted simultaneously to the conductors of voluntary motor power, producing transient or permanent effects, according to its force and the weakness or proclivities of the part upon which it falls, and to the vaso-motor nerves, causing sudden vascular changes in the brain which interfere with its nutrition. So, in two ways, mental shock causes paralysis; directly, through the direct nerve channels, and, indirectly, through the vaso-motor nerves. These changes are severally indicated by outward signs of muscular paralysis, and altered vascularity and nutrition.

Frequently, then, as vascular changes, occasioned by Emotion, may cause the morbid condition of the nervous tissue which entails paralysis, it seems very probable that a mental shock may

directly produce molecular changes in the brain and motor system, independently of those which arise from congestion, anæmia, or rupture of a bloodvessel. Handfield Jones has done much to demonstrate the possibility of exhaustion of the nervous centres without appreciable physical change. Violent emotion may well cause what he calls primary paresis of ganglion-cells in the encephalic, or spinal nerve centres. It is quite consistent with this, that almost simultaneously with the shock, and as long as this paresis lasts, the sympathetic should be in an opposite condition, as indicated by the pallor of the face.

Under the head of spasm of cerebral vessels, Dr. Bastian would place many cases of emotional and also epileptic hemiplegia; also a very few of hysterical paralysis. The speedy recovery which may take place lends force to the idea, as he points out, that mere molecular and recoverable damage has occurred. "We must not forget, however, that the exciting causes of such attacks may entail further changes. They may at the same time give rise not merely to spasm, but to actual rupture of the vessels in the motor ganglia, or they may set up nutritive changes in the nerve tissue which may subsequently lead to thrombosis in the part" (xlvii., April 25, 1874). Dr. Bastian then refers to a case in University Hospital as a good example—a young woman, "in whom a more permanent hemiplegic condition was suddenly established under the influence of strong emotion."

In emotional excitement we are ourselves conscious of the rapid alterations which take place in the circulation in the brain—the rush, the throbbing, the vertigo, the tinnitus aurium, etc. That the brain tissue should suffer, and paralysis should supervene, in a certain proportion of cases (those in which the cerebral vessels are weak or diseased), is natural enough. We cannot, therefore, doubt that emotional paralysis is not unfrequently due to extravasation, as well as the opposite condition of deprivation, of blood. This disturbance of the cerebral circulation may doubtless arise, either indirectly from the increased force and frequency of the heart's pulsations, or directly from the influence exerted by the emotions on the vessels of the brain.

TOTAL PARALYSIS.—General loss of muscular power—not what is understood by actual palsy—as the result of emotional shock, is well illustrated by a reference to the sad scenes in Ireland during the Revival, from which we drew such striking examples

of convulsion. We are told that "a great number were smitten down suddenly, and fell as nerveless and paralyzed and powerless, as if killed instantly by a gunshot." A girl, æt. 14, while singing, fell down instantly, deprived of speech and sight, "the mind as active as ever." This occurred in the evening; in the night she slept three hours and awoke in the same condition, and remained so till the next day—eighteen hours altogether—when she regained her voice and sight as suddenly as she had lost them. Medical remedies had been tried, but without effect; mental impressions, similar to those which caused, cured the malady.

HEMIPLEGIA.—A case from Dr. Todd has already been given in connection with the loss of speech. Many cases of hysterical hemiplegia are clearly of emotional origin. Dr. Todd considered absence of face and tongue palsy characteristic of this affection. The case of a young woman, æt. 30, subject to hysteria, is cited by Tissot, from Hoffmann (*Opera Omnia*, t. iii. p. 202, xxxv., 1865, p. 162). Terror suspended the uterine functions and caused, first, painful spasms of the limbs, and then hemiplegia of the right side; of what duration is not stated.

In the following case, under the care of Dr. Stewart, reported by Dr. Handfield Jones, hemiplegia was accompanied by impairment of speech:

"Mr. —, æt. 40–45, of gouty family and very nervous temperament, had long been subject to attacks resembling laryngitis. Just before his illness on this occasion, he had been in great anxiety on account of his wife's health; had been fatigued while nursing her, and with various cares. He had no renal disease. While going upstairs to his wife's bedroom, in advance of the medical attendants, he suddenly staggered, and would have fallen backward had he not been caught. He was now found to be quite hemiplegic on the right side, consciousness unimpaired, speech nearly lost, face very much distorted. He was put to bed, slept tolerably, and next morning when seen at 8 A.M., all symptoms of palsy had disappeared, but returned again after breakfast. *The paralysis ceased and recurred again several days in the same manner*, but he was always free from it in the morning. Some time after it ceased to recur, any nervous excitement or extra fatigue would reproduce the disorder in a greater or less degree. Shortly afterwards he was seized with complete aphonia, and the same has repeatedly occurred subsequently, but has twice been

removed by galvanism. In the winter of 1861-62, he had a return of the paralytic symptoms, accompanied by rheumatic pains" (lxxi. p. 481).

It is very interesting to observe that the hemiplegia occurred on the right side. It is in accordance with what might be expected, that where mental strain is considerable, the left hemisphere is worked more severely than the right, and would consequently be the first to fail.

Dr. Jones states that, in the opinion of three eminent medical men, there existed no organic disease, and remarks that the paralysis is fairly attributable to the exhaustion of nerve power, the chief cause being great anxiety.

Marshall Hall records in his *Practical Observations in Medicine*, that two cases of hemiplegia under his care at the time of writing, were induced by parental anxiety. In the *Medical Times and Gazette*, May 23, 1868, there is a short report of a striking case of paralysis induced by Fear. It occurred at the Limerick Sessions, where two men were charged with having assaulted a relation. "The prosecutor (Roche) summoned his own father as a witness. The mother of the prisoners, exasperated at the prospect of her sons being sent to prison on the evidence of her own relative, gave expression to her feelings in a malediction, praying that when the old man left the witness-box he might be paralyzed; and paralyzed he was accordingly, and had to be taken to the hospital. Such miraculous illness not yielding readily to ordinary modes of treatment, the old lady has been requested to remove her curse by spitting on the patient; but this she sternly refuses to do, and the man remains in the hospital."

On the prognosis of emotional hemiplegia Dr. Todd remarks that, although it promises ultimate recovery, it is often very slow.

A very ancient synonym for paralysis—aphonia—indicates the frequency of impairment or loss of power over the vocal organs in this affection. Paralysis of emotional origin is, indeed, most frequently seen in connection with loss or impairment of speech. Of course, this symptom may be associated with widely different conditions of the nervous system—with lingual paralysis, paralysis of the laryngeal muscles, or with inability to recall words, etc.

Speechlessness, in short, may result from disorder (loss of function) of the gray matter of the convolutions, the fibres which connect them with the sensori-motor ganglia, these ganglia them-

selves, or the motor nerves proceeding thence to the muscles employed in speech.

Thus it is clear that a violent emotion may so affect the intelligence that, although a person can move his muscles, he no longer has the right idea at hand to communicate, and is speechless in consequence; there being, in fact, no motor paralysis. Again, he may have ideas, and may be unable to communicate them by vocal signs—by speech—this condition arising from a break in some of the fibres passing from the convolutions to the motor centres, which prevents the Will being transmitted¹ to the central ganglia, or, as is more probably the case, from such a change in the motor centres that the nerves supplying the muscles engaged in speech, those, namely, of vocalization and articulation, are paralyzed. The disturbing influence already referred to, of a part of the brain, the function of which is not motor, upon one which is, admits of application here.

Mild and transitory forms of speechlessness are familiar to all, and may not deserve the name of paralysis, but they indicate the initial stage. The Virgilian "*vox faucibus hæsit*" occurs to every one, and Shakespeare's description of Collatine is a perfect description of the influence now referred to.

"The deep vexation of his inward soul
Hath served a dumb arrest upon his tongue;
Who mad, that sorrow should his use control,
Or keep him from heart-easing words so long,
Begins to talk; but through his lips do throng
Weak words, so thick come, in his poor heart's aid
That no man could distinguish what he said."

LUCRECE.

Of Sir Philip Francis ("Junius") it is said in his biography, "Indignation would at times master his utterance. For betrayed confidence or violated friendship he had burning words of reprehension on paper: but his spoken comment scarcely got beyond a single word, muttered as if to himself, with clenched hand and knitted brow. 'Base, base! He, too, the hound!' . . . Without the aid of tone or gesture, he must often have been mis-

¹ Or the fitting word recalled—the "motor intuition," Dr. Maudsley would say, associated with a certain idea organized in the motor centres of speech by education. See his able paper "Concerning Aphasia," in the *Journal of Mental Science*, January, 1869.

understood" (xiii., ii. p. 395). Recurring here to the remarks formerly made in regard to the purposive character of emotional acts, it might be objected in these cases, that this very association of the emotions with important muscular movements is an actual disadvantage. Is not the utterance constantly choked thereby, just when we most desire to express ourselves? It may be replied, that inarticulate utterances, rendered so by emotion, are themselves more effective than the best chosen words. A striking proof of this is given in Sir P. Francis's own description of the eloquence of Fox. "Panegyric," he says, "was not his forte, and when he attempted it, it was none the better for preparation. A few words of sorrow or applause, coming of themselves in the course of agitation of some other question, and starting from it as if they had escaped him; a breathless pause, a broken sentence, and then a rapid return to his subject, as if for an instant relief, could not but have made a deep impression on any audience. *For who can resist the inarticulate sorrows of a wounded heart?* His eulogy of Francis, Duke of Bedford, seemed to me a performance very unequal to the subject and the speaker. I am sure it made little impression, and the less because it was the result of pains, and accompanied with an emphatic delivery. Had he unexpectedly heard of the Duke's death while he was speaking in the House, and sudden grief had made its way in a natural, unpremeditated burst of passion, which alone can be pathetic, I think he would have succeeded much better, even, possibly, enough to touch the androgynous heart of William Pitt. . . . If in a transport of grief his voice had failed him, *or his speech had ended abruptly*, there were but few men, even in the House of Commons, callous enough not to have been affected by the subject, the actor, and the scene."

When men are struck dumb by Terror or mental excitement of any kind, the pathological condition may, as we have said, vary, but usually we may infer there has been a shock to the motor centres, involving temporary paresis of the nuclei of the nerves supplying the muscles concerned in either articulation or vocalization, or in both. These nerves no longer respond to volition, but gesture-language and writing remain. A case lately occurred at Aldershot, which illustrates the effect produced by passion; the passion of a man which, levelled at another, recoiled upon himself. It is reported by Major Miller, the Governor of

the Military Prison there: "One of our prisoners, on being checked at drill by one of the warders, wished that 'God Almighty would strike the warder dumb.' The prisoner was struck dumb on the spot, and did not recover his speech for seven days. During the period he was deprived of speech, he was strictly watched. There was no feigning whatever; the man was most wretched and alarmed." (*Good Words*, Sept. 1870.) Dr. Handfield Jones gives from *Casper's Wochenschrift*, 1848, the case of a sailor, witnessed by Paulini, when surgeon on board a vessel. A violent storm arose, threatening immediate destruction to all the crew. One of them, a healthy Dane, æt. 30, of fair complexion and light hair, was so terrified that he fell speechless on the deck. Sanguineous perspiration followed, and from this point of view the case has a special interest, to which we shall again refer. It is sufficient to add here, that as this symptom disappeared the power of speech returned, and the sailor was perfectly well after the storm had passed away.

In these cases—the Revival girl, the soldier, and the sailor—a powerful emotion produced concussion of the motor centre concerned in the expression of ideas by the muscles employed in speech. There was no power of articulation, but there is no reason to suppose they could not have expressed themselves by gestures or by writing.

Dr. Todd in his *Clinical Lectures on Paralysis*, which contain a definite reference to emotional paralysis, as observed in men of hypochondriacal habits and in women, remarks that "it most commonly consists in a simple loss of speech, occurring under some strong excitement, the power of speaking returning usually in a few days, and indeed generally very rapidly after the patient has regained the ability to pronounce one or two words, such as 'yes' and 'no.'"

The case which Dr. Todd gives by way of illustration is as follows:

"The patient was a man between 50 and 60 years of age, of irritable temper and hypochondriacal habit. A question, respecting some very trifling matter, happening to arise one evening in his family party, some one present held out too strongly against his views, and this led to a vehement contradiction on his part, which was met by a counter-statement and a rejoinder, and thus he became excited to such a degree that his

power of speech completely abandoned him. . . . The patient had full use of his muscles; he had full power over his hands and feet; he could sign a cheque, and his mental faculties seemed unaffected; only he could not speak, and whenever he tried to do so, the attempt would end in a fit of crying. He continued in this speechless state for about a week, when he recovered, and when once he began, the power of speech returned fully in a very short time. Two years after this occurrence the same gentleman got into a similar argument and difference of opinion upon a matter equally trivial, and again became strongly excited; but this time, instead of becoming speechless, he became hemiplegic on the left side, without mental affection, but with decided palsy of the left side of the face. The paralysis was not complete, for he could move the fingers and leg very slightly. After a little time, without any other treatment than that of removing, so far as possible, all exciting causes, he recovered to a great extent the power over the arm and leg; but although the principal recovery took place about six weeks after the attack, he is now, four months after the occurrence of the hemiplegia, by no means quite well" (lxxiii. p. 283).

Dr. Todd adds that, as he had never examined the brain of patients suffering in this way, he could not say how far there had been lesion, but he thought it must be slight, if any, and resemble that occurring in the transient hemiplegia which follows epileptic seizures (see remarks, *ante*). In these cases he entirely discards the vulgar and convenient explanation of congestion, believing that the vessels only play a secondary part in the production of such functional derangement. Hyperæmia is only an effect of a morbid condition of the brain-tissue, or of the blood, or of its circulating force. In emotional paralysis, according to this view, the polarity of a certain portion of the brain is disturbed—exalted—and is immediately followed by exhaustion, as excessive muscular action exhausts and depresses the muscular force. This condition, if prolonged, may by the arrest of nutrition involve softening; but it is the transient form to which this explanation has more especial reference. In this case, however, judging from the subsequent attack, it seems probable that the first seizure was not an example of mere nervous shock, as in the previous cases, but of some vascular change. Indeed, from the "trifling" character of the exciting cause, it may be inferred that the brain

was already disordered, and on the brink of changes involving paralysis.

Dr. Lavirotte attributes, in the following case, the invasion of paralysis to Anger; but he thinks also that it *may* have been only a symptom. The muscles generally, including those of articulation, were paralyzed, but the patient's intelligence was unaffected.

Françoise Classin, aged 28, possessing a strong constitution and married. Two years ago she had a violent altercation with her husband, and being herself in a great passion, she lost her speech. She became unable to walk or support herself, or eat without assistance. At the end of six months her speech had gradually returned, and she could walk a little and grasp large objects. She has subsequently recovered some power over her muscles, but has great difficulty in turning over the pages of a book, and in walking she is obliged to seek some support. She has never experienced any pain; with the exception of amenorrhœa, the bodily functions are healthy (xxxv., 1859, p. 451).

A different class of cases—those in which only the vocal cords are (functionally) paralyzed, the tongue, lips, and palate remaining unaffected (as also the intelligence)—is illustrated by a case Mr. Skey mentions in his *Lectures on some Medical Subjects* (xlv., Sept. 22, 1866). It affords a good example of aphonia of emotional origin, in a hysterical subject, the nuclear centre of the recurrent laryngeal nerve being temporarily paralyzed.

"The subject," he says, "was a young lady of about 20, of pale complexion, and having cold hands and feet. Whilst I was engaged in conversation relative to her health, I somewhat imprudently remarked that a mouse was running about under the table at the end of the room. She uttered an exclamation of alarm, and in an instant so entirely lost the power of audible speech, that I was obliged to approach her and to put my ear close, to hear her. The ferocious cause of the mischief having paid the penalty of its intrusion by the loss of all it possessed on earth, the lady, in the course of an hour, recovered her voice. Had this person been in sound and vigorous health, she would probably have sustained the shock to her nervous system with less derangement of it. The case is interesting, as showing the sudden influence of the mind on a particular nerve in the general system."

Mr. Fletcher records a case of aphonia in a gentleman, brought on by profound Grief, Fear, and Remorse: "There was no other symptom but that of aphonia about him, besides general languor and despondency. His voice had been gone for five weeks. I held a long, cheering, and soothing conversation with this very stout and healthy person, during which he became satisfied that there was no return of a complaint, the thoughts of which weighed heavily on his mind. He was directed to rise early, take the air, enter society, and drink a few glasses of wine after dinner. A week afterwards his voice had fully returned" (lxxiv. p. 327).

As a contrast to these cases of loss of power over the vocal muscles, take the following illustration of the influence of fright in causing serious cerebral mischief and "aphasia." I abridge from the *Lancet* of Sept. 17, 1870, the report of the case, which was under the care of Dr. Habershon.

The patient saw one of her children scald herself, and ran and caught her in her arms; then, having handed her to another person, immediately lay down, and from that time remained for three days motionless, unconscious, and without food. On admission at Guy's, three weeks after, she could say two or three words very imperfectly, her pupils were equal, her physical powers unimpaired. On being questioned, she indicated that she had great pain at the vertex of the head. Three days after, she appeared perfectly intelligent, but replied to almost everything, sometimes with a little hesitation, "Yes'm;" sometimes, however, to a question requiring a negative reply, two or three times repeated, she succeeded in answering, "No, m'm;" and once or twice she, with great effort, and after some failures, expressed one of the first two or three numerals, but days, weeks, months, and years, were quite beyond her utterance, and after several despairing shakes of the head, a great effort would end in the almost invariable "Yes'm." She remained quite unable either to read or write. Five days after, the pain in the head was less severe; she could make almost any reply, requiring no more than two or three short words, but the interrogator was still addressed as "mum." She also read one or two short words correctly, and was able to write her name distinctly. When again seen, four days later, she was walking about the ward, apparently in perfect health. She still complained of pain at the top of the head, and

though her vocabulary was limited, and her speech sometimes hesitating, she was in a fairly convalescent condition.

Dr. Hughlings Jackson informs me that he has not met with any evidence to prove that emotional disturbances produce aphasia. It occasionally happens, he admits, that after fright, anxiety, etc., the patient does not *talk*, but these cases, whatever their explanation may be, are not, according to him, cases which can be properly called aphasic. At any rate, they differ very much, clinically, from cases of aphasia produced by a structural lesion. He does not believe that such one-sided symptoms as hemichorea, hemiplegia, etc., are ever *solely* caused by emotional disturbances. Hemichorea very frequently *follows* fright, but Dr. Jackson holds that there must of necessity be some local change in the central nervous system, or the symptoms developed by fright would not be one-sided. Possibly the normal structural difference in the two hemispheres may render one *more* likely to give way under the influence of a *general* bodily disturbance such as fright. (Mr. Callender has brought forward evidence to show that lesions of the right hemisphere are more likely to produce convulsion than lesions of the left hemisphere.) But if so, this is the exception proving the rule; it is only substituting a physiological for a pathological difference. The symptoms which Dr. Jackson believes may be attributed to emotional disturbance are—1st, such symptoms as nervousness, depression of spirits, and sleeplessness; 2d, such as loss of voice and tetanus-like convulsion (so-called hysterical tetanus). As to the last two symptoms, he remarks that they show that parts of the central nervous system are affected which superintend movements largely involuntary.

Under the head of "Emotional Paralysis," is the report of a case in the *Lancet*, Aug. 11, 1860, by Dr. Wiblen, and although the employment of the term here is perhaps open to criticism, the case is not without interest, and, undoubtedly, the immediately exciting cause was emotional:

"A gentleman, after being exceedingly desponding for ten days, and attaching more importance than usual to ordinary affairs of business, became, on the 4th of July, much excited in connection with a very trivial occurrence. This excitement was followed by entire inability to speak, and by facial paralysis. During the following night his condition was comatose, and on

the next day, when a slate was given him, "he wrote ciphers perfectly unintelligible, but in the course of a few hours was able to express himself in writing. During this interval he was seized with several paroxysms of sobbing and crying, after which he again fell into a comatose condition, from which, however, he could at times be readily aroused." On the third day he was able to say "yes" and "no." From the 10th to the 20th of July he progressed slowly but satisfactorily, and was able to converse with tolerable distinctness. With the exception of slight loss of motion and sensation of the right angle of the mouth, and deviation of the tongue, he had recovered at the time of the report. Dr. Wiblen ascribes the symptoms to slight pressure or structural change at the origin, or in the course of the lingual and glosso-pharyngeal nerves, but the higher centres appear to have been also involved.

The defect in this case, viewed from our present standpoint, lies in the absence of any apparent cause for the despondency. This depression of mind appears to have been itself a symptom of, and caused by, some cerebral mischief. It is true that some irritation in business occurred just prior to the attack, but it is expressly stated that it was trivial. The emotional condition and the paralytic seizure were alike the results of an abnormal condition of the brain. Still, the case is valuable, not only because the exciting cause of the paralysis was an impression on the mind, but because emotional disturbance (originating *ab intra*) preceded the motor affection. The tendency of morbid emotional states, whether arising originally from within or from without, to pass on and affect the motor centres, is exhibited in this case.

Since the above was written, Dr. Wiblen has kindly sent me a short report of the subsequent history of this case. In reply to my inquiry whether the despondency could be traced to a sufficient cause, he says (Nov. 5, 1870), "the patient was in very good circumstances, and had no reason to be otherwise than most happy," a fact which confirms the foregoing remarks in regard to the primary cerebral origin of the patient's mental condition. This is further borne out by the sequel of the case, which proved to be of no merely functional and transitory character. "It went," he states, "from bad to worse, and the patient died about two years afterwards. He had all the same symptoms as described in the *Lancet*, up to the time of his death. He was a very careful

man as to mode of living. His gray convolutions were drilled with small cavities." He adds that he has seen two other cases since—both died—and that the late town-crier of Southampton was in a similar condition.

I am able to add, through the kindness of Dr. Lockhart Clarke, a report of his examination of the brain. The pia mater generally was very much thickened. The gray substance of the convolutions had an unusually pink color. On the *right* side from behind forward, through the posterior and middle lobes, nothing more unusual was observed until reaching the optic thalamus. At the deeper part of this body and in the cerebral substance, on its outer side, there was a great deal of red softening. Patches of red softening were also found at the anterior part of the corpus striatum. On the *left* side of the brain there was found, in the middle of the optic thalamus, a cavity or cyst about the size of a pea, and containing a yellowish fluid outside the thalamus; the cerebral substance was softened, reddish-black in color, and infiltrated with fluid, which, under the microscope, was found to be loaded with exudation or compound granular corpuscles. The cerebral matter itself contained these bodies in abundance, besides a vast number of molecular particles. In the central white substance of the cerebellum, around the corpus dentatum on each side, there were two or three small cysts. One of them contained a perfectly milky fluid, which consisted of fat and oil particles. The medulla oblongata was softened and unhealthy along the fourth ventricle. Nothing remarkable was found in the spinal cord.

Professor Ball, of Paris, who explains the occurrence of sudden dumbness, in some instances, by a spasm or cramp of a small area of the vessels of the brain—"cerebral ischæmia"—records the case of a man, aged 45, who one day in 1877 entering hotly into a discussion, and falling into a violent passion, lost his speech. He had previously enjoyed good health, his heart was healthy, and he was steady in his habits. He could after the attack express himself in writing with facility. He had no intellectual disturbance—no true aphasia. Sensation and motility were normal. He could put out his tongue in any direction, but when he attempted to speak, a sort of convulsion affected it. It assumed the form of a hard convex dome, and was forcibly pressed against the palate. He was pale. He recovered his

speech within a fortnight without taking any medicine. The circulation, on Professor Ball's hypothesis, having returned to its normal channels, the function of speech was reëstablished (ciii., No. 1, 1881, p. 7).

PTOSIS.—Partial paralysis of the third nerve (*levator palpebrarum*) may arise from emotional causes. A case of ptosis from grief is recorded by Dr. Sutherland. "Sudden shocks, as is well known, cause local paralysis; thus ptosis of both eyelids was produced in a patient of mine, when she heard of the intended marriage of a gentleman to whom she was engaged, under more than usually painful circumstances; the ptosis of the eyelids soon disappeared, but the symptom was followed by an attack of melancholia, with a strong suicidal tendency" (lxxi. p. 120).

PARAPLEGIA.—Professor Ball has referred to paraplegias caused by Fear in their bearing on cases of sudden loss of speech and hearing from the same cause, and in which he attributes the disorder to cerebral ischæmia. He quotes the German author, Brieger, who in similarly attributing these paraplegic affections to vaso-motor spasm, observes that a fugitive constriction of the vessels may determine evanescent disorder, while prolonged contraction may induce profound and lasting organic changes (ciii., No. 1, 1881, p. 18).

Dr. Brierre de Boismont adds to a case illustrative of mental action upon the liver and stomach, one which similarly illustrates the effect produced upon the motor system :

"A little peasant girl, Lucia Marini, eight years old, was separated for some time from her mother, a patient in the hospital. She had often begged to be taken to see her mother, but her relations, thinking it only 'caprice,' always refused. The child often repaired to the church to pour out her grief, and was one day found at the foot of the altar, sobbing and almost deprived of consciousness. Shortly after appeared symptoms of an affection of the cerebro-spinal axis, delirium, headache, and inability to stand. Leeches were applied to the head, and a seton inserted in the neck. This treatment relieved these symptoms, except the paraplegia, and on account of this she was removed to the hospital. Scarcely was she in her bed, than she begged again with tears ('caprice!') to see and embrace her mother. The doctor (kinder, as is so often the case, than the friends of the patient) immediately ordered her request to be granted. Carried

in the arms of the nurse to her mother's bed, she threw herself upon her neck, covered her with tears, earnestly inquired after her health, and seemed as if she could not caress her enough. After awhile she was requested to leave her mother and return to her bed. On their attempting to carry her, she sprang to her feet and cried out with delight that she had recovered the use of them. She regained her bed without effort or fatigue. During the time, about ten days, that she remained in the hospital, no unfavorable symptoms returned, and she occupied herself in assiduously waiting upon her mother" (xxxv., 1853, p. 537).

Another illustration of paralysis resulting from mental emotion may be found in Hoffmann (*loc. cit.*).

In this case the vicious conduct of a young man was discovered by his father, and the chagrin of the former caused paraplegia, which proved incurable.

FACIAL PARALYSIS.—In the *Lancet*, February, 1871, is reported a case of "Facial Paralysis from Fright," under the care of Dr. Wiltshire, in the West London Hospital:

"The patient was an intelligent little girl, aged five years. Four days previously she had been much frightened during her mother's absence from home. On the following morning, the mother noticed that the child's mouth was drawn to the right side, and thinking that she was playing with her mouth, scolded her; but it soon became evident that the distortion was not voluntary. On admission it was found that, when the face was at rest, the paralysis was not betrayed, but during crying or laughing, the mouth was considerably drawn over to the right side. The left eye watered considerably; it could not be closed. There was no ptosis, nor were there any decayed teeth, enlarged glands, or evidence of the existence of worms. There was no otorrhœa or other symptom of disease of the temporal bone, nor squinting, nor paralysis of any other part of the body. The child was rather restless during sleep. A grain of bromide of potassium was ordered to be given three times a day; and thirteen days after admission the following note was taken: 'Has slept much better since taking the medicine. There is decidedly less paralysis. The left eye discharges a good deal, but is not inflamed.' On the thirty-second day it was noted that there was scarcely any evidence of paralysis remaining; 'in fact, the only sign is a slightly quicker and more complete blinking of the right

eye than the left when one pretends to give the child a blow in the face.' On the forty-sixth day the child ceased to attend.

"Three months after, the child was brought again to the hospital suffering from scarlatinal dropsy. It was ascertained that she had had no return of the paralysis, and presented no trace of it."

I have not met with any other good instances of the influence of emotional excitement on the *portio dura* of the seventh, but the late Dr. A. J. Sutherland asserted that "paralysis of the seventh nerve is a well-marked symptom of disease of the brain from severe mental shock." I observe the remark in Romberg, that "violent mental emotions have, in some instances, preceded its occurrence," and he refers to Joseph Frank in confirmation (*Prax. Medic. Univer. Precepta*, 2d edit., vol. i. p. 556).

PARALYSIS OF SPHINCTERS.—The nerves that control micturition are, so far as the *sphincter vesicæ* is concerned, subject, as is well known, to temporary paralysis from emotional causes. Instances of temporary paralysis of both vesical and rectal sphincters are to be found in the annals of every war, on occasion of the first engagement. When the vesical muscle is itself paralyzed, the non-striated fibres and the sympathetic are involved, and will be referred to in a subsequent section. The same remarks apply to the rectum and its sphincter.

Having now completed the survey of the influence of the emotions in the range of the motor nerves which supply the voluntary muscles, we proceed to pursue the same inquiry in regard to those muscles over which the Will has no power—the non-striated muscles and the heart. Here also we might examine the phenomena according as they assume the form of simple contraction, spasm, or paralysis, but we shall only refer incidentally to these states.

CHAPTER IX.

INFLUENCE OF THE EMOTIONS UPON THE INVOLUNTARY MUSCLES.

THE Emotions act upon the Heart and non-striated muscles with a power similar to that which they exercise over the voluntary or striated muscles; causing contraction, spasm, and paralysis.

Hitherto we have, as far as possible, restricted our attention to the movements caused by the action of the emotions upon the muscles over which the Will *can* exert more or less control, whether muscles of purely voluntary or of a mixed character, all these being striated, and supplied by nerves undoubtedly derived from, and forming an essential part of the cerebro-spinal system. From the compound character of some *acts*, as Respiration, it is impossible to avoid their consideration, in both categories of muscular fibre, the voluntary and the involuntary. This must not, however, be allowed to obscure the important facts, that while all muscles are liable to be influenced by the emotions, only some can be influenced by the Will; and that these derive their nervous influence from cerebro-spinal nerves, while those which respond to emotional but not to volitional, stimuli, derive theirs chiefly, if not entirely, from the sympathetic. Claude Bernard, indeed, refuses to admit the distinction indicated by these terms, and says they ought to be expunged from the vocabulary of science; but it is sufficient to reply, in justification of retaining them, that the sympathetic ganglia enjoy certain special powers, that although the sympathetic nerves arise from the spinal cord (including the medulla), microscopists believe them to be derived from a distinct order of cells, that he himself cannot escape the distinctive use of the word against which he protests, and allows that "it is highly probable that in the difficult and complicated study of the nervous system, we meet *with two distinct orders of nerves*; the vessels are placed under the influence of the first, while the histological elements

obey the power of the second; nutrition depends on the former, and physiological activity is aroused by the latter." Although he adds, that "the sympathetic nerve may therefore be viewed as a complementary apparatus placed by the side of the cerebro-spinal system," and refers the different results of excitement of the two, to the different nature of the elements on which their action is exerted, there is sufficient reason, we think, for continuing to use these well-understood terms, while not denying the spinal origin of the sympathetic.

Passing, then, from the voluntary muscles, we proceed to consider the influence of the emotions upon the heart and non-striated muscles.

THE HEART.—The influence of the emotions upon this organ is so remarkable, that it has always been a problem of great interest to determine the nature of their relations, and to ascertain from anatomical facts, why it is that the feelings and the heart are, and always have been, so inseparably connected. The heart, it need hardly be said, is a most prolific source of figurative modes of speech. Indeed the fact from which this arises—that of the heart being regarded by mankind as the organ of the passions—is itself an indication of the intimate relation subsisting between certain states of the mind¹ and the movements and sensations of this viscus. "Heart-rending" descriptions, "cordial" expressions of good-will, and numberless cognate terms at once occur to the mind. Elihu said "at this also my heart trembleth and is moved out of his place." Dr. Johnson's commentary on the word is "The heart is considered as the seat of tenderness; a hard *heart* therefore is cruelty." "Lorsque Dieu," says Bossuet,

¹ Lactantius, in making some acute remarks on the state of the mind in ecstasy, in his treatise *On the Workmanship of God or the Formation of Man*, says, "The mind which exercises control over the body, appears to be placed in the highest part of the head, as God is in heaven; but when it is engaged in any reflection, it appears to pass to the breast, and, as it were, to withdraw to some secret recess, that it may elicit and draw forth counsel, as it were, from a hidden treasury. And, therefore, when we are intent upon reflection, and when the mind, being occupied, has withdrawn itself to the inner depth, we are accustomed neither to hear the things which sound about us, nor to see the things which stand in our way. But whether or not this is the case, it is assuredly a matter of admiration how it takes place, since there is no passage from the brain to the breast. But if it is not so, nevertheless it is no less a matter of admiration that, by some Divine plan or other, it is caused that it appear to be so."

"forma le cœur et les entrailles de l'homme, il y mit premièrement, la *bonté* comme le propre caractère de la nature divine."

Gesture-language is equally significant, whether in the wild Indian who expresses fear, "by putting the hands to the lower ribs, and showing how the heart flutters and seems to rise to the throat" (Tylor), or in the civilized white man, who "lays his hand upon his heart" when he desires to emphasize the force of the gesture under which he labors.

It is not surprising that men should wonder how this comes to pass, if what the physiologist tells them is true, that the feelings which they associate with the heart are really seated in the brain. In Queen Elizabeth's age, a poet¹ wrote:

"But since the *brain* doth lodge the powers of sense,
How makes it in the *heart* those passions spring?"

The poet's reply—

"The mutual love, the kind intelligence
'Twixt heart and brain, this sympathy doth bring;"

if vague, is scarcely more so than what we find in some medical works. Burdach, writing in 1726, observes that it is said "I love you with all my heart," "this tears my heart," etc.; not because those sentiments are produced in the heart, but because in every violent affection, either the heart or other parts, by the movements of which we describe the affections, in our language, act *sympathetically*. (*Meditationes de Animâ Humanâ*, cap. vii. p. 198, xxii., ii. p. 75.) But Burdach was opposing the vulgar error that the heart is itself the seat of the passions. Plato had placed one of his three faculties of the mind—the irascible—in the heart, and Aristotle had made it the seat of the soul and the origin of the nerves. Others followed in the same direction. It is remarkable that while Unzer and Prochaska entirely avoided this error, later physiologists, like Virey, should have returned to the old and vulgar idea. "See," says Bichat, consistently with his location of the Passions in organic life, "see the man who is agitated by anger or fury; his muscular powers doubled, nay trebled, exert a force which he cannot even check. Whence this increased power? Manifestly the source is in the heart" (li. p. 46). In

¹ Sir John Davies (the Queen's Attorney-General), in his book entitled *The Original Nature and Immortality of the Soul*, 2d edit., 1714, p. 78.

Fear, on the other hand, the heart, also the starting-point with him, sends less blood than usual to the brain, and causes feeble action of the voluntary muscles and syncope. Unzer, when treating of grief and fear, observes "an irregular influence of the vital spirits on the nerves of the heart renders its movements at one time excessive, at another enfeebles them even to syncope" (i. p. 170). He clearly does not locate the emotions in the heart. Virey, after observing that "According to Prochaska, the passions act on the heart by means of the nerves of the eighth pair," adds "but may it not be maintained, on the contrary, that the emotions of the heart *ascend* to the brain by these same nervous branches? For Vauvenargues said with reason, *great thoughts come from the heart.*" . . . "Instinct is innate in the breast; it emanates from within the internal organs of life; it acts without the concurrence of the brain." Gall, who cites these passages only indignantly to refute them, replies, "the organ which produces an affection or a passion is, in fact, confounded with the viscera on which this affection or this passion acts. The nervous systems of the chest, the abdomen, the spinal marrow, of the senses, of the brain, are placed in communication by nervous branches in order that they may act reciprocally upon each other" (xxii., ii. p. 76).

Gall as strongly combated the notion with which these views were closely connected, that the ganglia of the sympathetic are themselves the seat of the passions, and justly asserted that "emotion being felt in certain parts, in connection with the affections and passions, proves nothing as to their seat" (l. c.).

It is not necessary to repeat the observations already made (p. 146) discarding any hypothesis in regard to the localization of the passions, which does not refer their seat to the encephalon—employing this term in its most comprehensive sense. Their ideational element is as clearly referable to the hemispheres, whatever probability may attach to the view that the emotional element is, in common with sensation, a function of one of the ganglia at the base of the brain, and in close relation with the medulla oblongata. The application of this view (or of any modification of this view, such as the localization of the centre of emotional movements in the medulla) to emotional disturbance of the heart and lungs, is obvious. "When a violent and sudden emotion causes death, it is in acting on the medulla oblongata that it has such a powerful effect" (Brown-Séquard;

lix. p. 226). It only remains to inquire here, through what nerves do the emotions influence the heart?

HEART'S INNERVATION.—Experiments which are now regarded as conclusive have determined the chief channels through which the higher centres may influence the motor ganglia of the heart. Thus it is now established that inhibitory influences are carried habitually down the vagi, while acceleration of the heart's rhythm is brought about by nerve impulses travelling along the sympathetic nerves which accompany the vertebral artery, and are continued through the inferior cervical ganglion into the inferior cardiac nerves. The most important step towards clearing up the mystery surrounding the mechanism of emotional cardiac disturbance is therefore made clear. It must still be remembered that although the above explanation of emotional action through the pneumogastric and sympathetic nerves accounts for some of the more obvious and suddenly developed effects of emotion on the heart, it does not explain those cases in which gradual inhibition of the heart slowly proceeds to a fatal termination, since the effects of artificial stimulation of the vagus soon pass off, *i. e.*, disappear before the nerve dies locally at the part laid bare. It is more probable that in cases of this kind there is a primary vaso-motor change, leading to gradual abolition of function either of the distal centres directly (*e. g.*, cardiac ganglia), or indirectly by constant inhibition originated by vascular changes in the vagal nuclei, etc.

Professor Gairdner, after weighing the contradictory evidence adduced in favor of the rival theories in regard to the production of angina pectoris, points out that, if regarded as a pure neurosis, the paroxysm may be partly attributed to vaso-motor spasm, affecting the cardiac circulation directly through its smaller arteries, and partly to inhibitory influence of the vagus. The latter, he considers, "would account more reasonably and probably than any other for those cases of angina in which mental causes, and sudden shocks of any kind, are known to influence the production of the paroxysm, without the intervention of peripheral changes such as can be attributed to vaso-motor spasm. In cases again, resembling in their symptoms those described by Nothnagel, whether accompanied by organic disease or not—cases in which coldness of the surface, deadness of the extremities, and perhaps palpitation or increased rate of the pulse, can be ascer-

tained to precede the cardiac pain, there would be reasonable ground for presuming that the vaso-motor nerves were the earliest involved in the morbid circle, though it is still probable that if such cases ever end in sudden death, it is through some more direct impression on the cardiac nerves, or on the coronary circulation" (cviii., iv., 1877, p. 582). Professor Gairdner does not regard angina as a pure *neurosis*, but holds that the paroxysm is the expression of sudden changes which, although they may arise from emotion, etc., are only serious on account of their connection with actual disease in the circulatory system.

The ganglia of the heart appear to act in the way of coördinating the influence of all the nerves supplying the organ. As Moleschott observes, "The heart is animated by four very excitable nerves, which may be easily over-excited; these four nerves—two vagi and two sympathetics—have a peculiar consensus, which is, no doubt, due to the action of the ganglia of the heart, so that the state of irritation or over-excitement which is produced in one of the nerves is transmitted to the three others; but it is not possible to exhaust permanently the other three by over-excitation of one nerve *singly*, as stimulants which would be powerful enough to effect this would soon kill the excited portion of the one nerve, and therefore lose their effect upon the other three; such an effect being only possible as long as the nerve acted upon retains part, at least, of its excitability." (*Medical Times and Gazette*, July 27, 1861.)

We must, in attempting to explain the injurious mode of action of certain emotional states upon the heart, suppose that the normal control which is constantly being exercised by the pneumogastric nerve is, under excessive Emotion, so intensified by increased stimulation at its origin in the medulla oblongata, that the pulsations of the organ are partially or wholly arrested.

ILLUSTRATIONS.—Acceleration of the heart through the sympathetic nerves is the most frequent and obvious result of emotional excitement, and very little observation suffices to show that opposite emotions produce, in this respect, the same result. Thus Terror and Joy alike cause palpitation. It may be that palpitation from the former is in part explained by supposing it to be the precursor of flight; but this explanation does not help us to explain the increased beatings of the heart from Joy. When, however, we speak of the same result being produced by opposite

emotions, we find, on closer examination, that this sameness applies to the frequency of the pulsations rather than to their character; that the palpitation of Joy is of the nature of increased vital action; that of Terror of simple irritation, and is no sign of power. It may, doubtless, be laid down as a general principle that pleasurable emotions increase the activity of the vital functions, and painful ones depress them. To this rule, the influence of these opposite emotions in causing increased frequency of the heart's pulsation offers no real exception. Terror induces an irritative frequency which, if continued, ends in cessation of the contractions of the organ; and Joy, if sudden, may be alike prejudicial. But take moderate and continuous Joy—a joyous frame of mind—and compare its effects with those of a permanently fearful or sorrowful state of the feelings, and the result will undoubtedly be in harmony with the foregoing principle. The real force and the regularity of the heart's beat will be increased under the former, and decreased under the latter condition. One of Hoffman's aphorisms runs thus: "*Tristitia, cordis motum, et sanguinis circulum reddit languidiorem.*" (*Opera*, tom. i. p. 193.)

To the explanation of the increased action of the heart in Terror, Mr. Darwin applied two of his principles already enumerated (p. 204), namely, (1) the direct action of the sensorium; and (2) associated habit. "When an animal is alarmed, it almost always stands motionless for a moment, in order to collect its senses, and to ascertain the source of danger, and sometimes for the sake of escaping detection; but headlong flight soon follows, with no husbanding of the strength as in fighting, and the animal continues to fly as long as the danger lasts, until utter prostration with failing respiration and circulation, with all the muscles quivering, and profuse sweating, renders further flight impossible. Hence, it does not seem improbable that the principle of associated habit may, in part, account for, or, at least, augment some of the above-named characteristic symptoms of extreme Terror" (xcv. p. 78).

Irregular contraction of the heart from emotion, from slight intermission to actual spasm, is a frequent circumstance. It arises sometimes from a particular cause, and is not excited by another which appears to involve a more powerful emotion. Active anxiety or suspense has a special tendency to induce it. John Hunter says he was subject to "spasm of his vital parts" when

anxious about any event—a circumstance of interest when his mode of death is remembered. “At my country-box I have bees which I am very fond of, and I was once anxious about their swarming, lest it should happen before I set off for town; this brought it on. The cats tease me very much by destroying my tame pheasants, partridges, etc., and rooting up my plants. I saw a large cat sitting at the root of a tree, and was going into the house for a gun, when I became anxious lest she should get away before my return; this likewise brought on the spasm; other states when my mind is much more affected will not bring it on” (ii., i. p. 236). Hunter could tell an affecting story without experiencing any spasm; but it acted upon his power of articulation—he had to stop several times during its relation. Passion, as well as anxiety, affected his heart. “My life,” he used to say, “is at the mercy of any scoundrel who chooses to put me in a passion.”

The nerves supplying the heart may be so affected by emotion as to cause more violent contraction—tonic spasm—of the organ, which, from its occurrence in a vital part, is followed by death. Whether this results from the withdrawal of antagonistic nerve force, or from the direct action of nerve force upon the muscle, it may be difficult to decide.¹ In the case of Hunter, who died of angina pectoris, the walls of the heart were contracted when examined after death. Let us refer to the record of his death and *post-mortem*. When the Governors of St. George's Hospital decided that no person should be admitted as a student without bringing certificates of having been educated in the profession (a regulation which appeared designed to exclude Hunter's countrymen), he advocated at the Board the admission of two young men, inadmissible under the new rule. His biographer, Mr. Palmer, states that, before the meeting, he expressed his apprehensions to a friend “lest some unpleasant dispute might occur, and his conviction that, if it did, it would certainly prove fatal to

¹ “Painful spasm is by no means unlikely to be associated with a tendency to sudden stoppage of the heart's action, or virtual paralysis, whether from inhibitory nervous irritation through the pneumogastriacs, or from disorders originating in the cardiac ganglia themselves, and allied in characters to true paralysis of muscular energy. . . . The question as between spasm and paralysis is one of great difficulty, if not indeed practically insoluble, in the present state of our knowledge.” —Prof. Gairdner, *cviii.*, iv. p. 580.

him." "Arrived at the hospital, he found the Board already assembled, and entering the room, presented the memorial of the young men, and proceeded to urge the propriety of their being admitted. In the course of his remarks he made some observation which one of his colleagues thought it necessary instantly and flatly to contradict. Hunter immediately ceased speaking, retired from the table, and struggling to suppress the tumult of his passion, hurried into the adjoining room, which he scarcely reached, when, with a deep groan, he fell lifeless into the arms of Dr. Robertson, one of the physicians of the hospital, who chanced to be present. . . . Various attempts were made upwards of an hour to restore animation, under the hope that the attack might prove to be a fainting fit, such as he had before experienced; but in vain; life had fled, and all their efforts proved useless." The *post-mortem* revealed a condition of the viscera such as might have been expected. The heart was found to be extensively diseased. It was small, appeared to be wasted, and was strongly contracted. On the left auricle and ventricle were two opaque white spots—the muscular tissue pale and loose in texture. The coronary arteries were converted into bony tubes, with difficulty cut across, and the mitral valves very much ossified. The aorta was somewhat dilated, and its wall thickened and wanting pliancy; the inner surface of the aorta studded with opaque and elevated white spots. The pericardium was unusually thickened, and did not contain much fluid. The viscera of the abdomen and head were loaded with blood, and the carotid arteries within the skull, and their branches, were thickened and ossified (ii., i. p. 132).

It is highly probable that, in such fatal cases as the foregoing, a severe and persistent spasm of the heart is at times the cause of death. It seems equally probable, on the other hand, that the same fatal effect may follow from emotional excitement, inducing a very different condition of the muscular tissue of the heart. The organ ceases to contract upon its contents, and becomes dilated and powerless. These opposite conditions are seen in voluntary muscles, and from like emotional causes; the heart being, in one case, rigidly contracted, or, in another, paralyzed, and the result only differing from that of cardiac spasm or paralysis, in the circumstance of the heart not being a vital organ.

Pettigrew quotes from Senac's *Traité du Cœur* (tom. ii. p. 4

the case of "a person who being witness to a dreadful shipwreck, was so operated upon by distress and terror, that palpitation of the heart was succeeded by oppressed breathing and syncope, and death ensued. Upon examination, the heart was found enlarged."

The late Dr. Peacock, whose large experience in diseases of the heart, made his opinion of great value, informed me that he had frequently observed palpitation and subsequently dilatation of the heart in women, follow upon mental distress and other emotional influences. He never met with a case of rupture of the heart from emotion.

Tissot asserts that dilatation of the heart and the aorta has been caused by Anger and Chagrin, and he refers for proof of the former to Bonnet, Morgagni, and others; and of the latter to Harvey, Zimmermann, etc. Bichat cites Desault's statement that diseases of the heart and aortic aneurisms are multiplied in revolutions, in proportion to the evils which they produce.

Speaking of intermittent pulse, Dr. Richardson observes "I have never met with a case in which the disorder was not sequential to some anxiety, shock, fear, sorrow, or their similars. I have met with case upon case in which the sufferer has been able, from his own perception of the intermittency, to register the precise moment when the injury causing it was inflicted" (xxi., Oct. 1869).

It is not surprising that at the present day, when the worry of life and strain on the feelings, in all ways, are so vastly intensified, that there should be strong evidence to show the increase of cardiac affections. From Dr. Quain's recent Lumleian Lectures on the Heart, at the College of Physicians, we learn that "during the last twenty years the total of deaths of males at all ages from heart disease has increased in number from 5746, in 1851, to 12,428, in 1870. The number of deaths from heart disease, for 1000 of population living, was .755 between the years 1851 and 1855; and it has risen to 1.085 from 1866 to 1870. This increase it must be observed, too, has taken place wholly in connection with the working years of active social life. There is no change in the number of deaths from this cause in males under 25 years of age. Between 20 and 45 years of age it has risen from .553 to .709, and that almost exclusively in adults, for there is scarcely any increase in the percentage of females dying from heart dis-

ease during the twenty-five years of life from 21 to 45" (xxxii., March 23, 1872).

Whether twenty years hence, in the days of "The Coming Race," when the Gy-ei of Lord Lytton will have fully engaged in the arena of public life, they will enjoy the same comparative immunity, is rather more than doubtful.

The disturbance of the heart's action indicated by syncope is a common phenomenon as the sequence of emotional excitement, and it is easy to understand how in cases where the heart is healthy, nothing more serious may occur, but where it is diseased and has already quite enough work to perform, it succumbs to any strong or tumultuous passion. We find here, as in other instances, that similar results are produced by very opposite forms of emotion—Joy and Fear—both however agreeing in this, that they are sudden and intense.

Sudden Joy, indeed, appears to have as decided an influence as Fear or Grief. It might hardly have been supposed that if we take two persons and subject one to the operation of a depressing, the other to that of an exciting emotion, the former may remain calm and the latter faint away. Yet, in many instances, such is the actual result. Lord Eglinton informed John Hunter that when two soldiers were condemned to be shot, but one was to receive a pardon, the event being decided by their throwing dice, the one who proved successful—thus procuring a reprieve—generally *fainted*, while the one to be shot remained calm. Sir Philip Francis, referring to an important crisis in his life, observes, "while my ruin was in suspense, I had felt infinitely greater distress of mind than now when it was determined. Extremities, once clear and unavoidable, reduce a man to take his resolution, and the very act of resolving gives vigor to the mind." In the foregoing case it would seem as if the mind, having been screwed up (so to speak) to the highest pitch of suspense, at once collapsed, when no subject calculated to occupy it or rivet the attention, either of present or future interest, presented itself. Whereas, when a certain fate was impending, the mind was aroused to contemplate it, and syncope averted. It may perhaps be said that the pungency of some painful emotions really prevents fainting, while a pleasurable emotion relaxes the system and favors it. That intense pleasure may induce a fainting fit is illustrated by the case of Lucretia Davidson, the precocious American poetess,

who died aged 17. "Her susceptibilities were so acute, and her perceptions of beauty so exquisite, as to cause her to faint when listening to some of her favorite melodies from Moore. Yet notwithstanding this serious impression she would beg to have them repeated, so delicious were the sensations produced" (lxxviii., Jan. 1855, p. 219). The influence here, however, was no doubt of a mixed character, both emotional and sensational; the former element, nevertheless, was the proximate cause of the heart's temporary failure.

We often see that the above-mentioned stimulus of Fear prevents fainting for just so long as it operates, and that directly it is withdrawn, the system yields to a reaction. Many perform deeds of heroism in the immediate presence of danger, and do the right thing after the danger is over—swoon away. So familiar a fact may seem scarcely to deserve an illustration, but the following related by Hunter (*Posthumous Papers*) is so much to the purpose that we cannot omit it. "A lady sitting up after every one was gone to bed, saw her door open, and a servant of the house come in with a pistol in his hand. She immediately blew out the candle, pushed the bed from the wall, and escaped between them. The servant in the dark pushed down the table she had been sitting by. This discomposed him; she came out of her hiding-place, got out at the door, and had the presence of mind to lock it. She awoke the house, and as soon as she found assistance or was secure, *she fainted*, and none knew what was the matter till she came to herself. The man was secured, and it was found that he was out of his senses" (p. 265).

Tissot quotes from Water (*Miscellaneous Natural Curiosities*, pp. 162-298), the case of a military man, who being about to possess the object of his desire, was so overjoyed that he suddenly expired. A *post-mortem* examination was made, and the pericardium was found to be distended with blood, although no rupture of the heart could be discovered.

A *post-mortem* was also made in the following case, which illustrates the effects of Joy, during an election. Mr. Froud, aged 52, of London, for many years a messenger in the War Office, became very much excited at the result of a Cabinet Council on the 23d February, 1874. Some days afterwards he became ill, and on the following morning, remained in bed reading Mr. Disraeli's speech in Buckinghamshire. He then became intensely excited, ex-

pressed his delight at the success of the Conservatives, got up and walked to his wife who was in the room. She put her arms round him, and begged him to calm himself, when he slipped from her and fell dead on the floor. Dr. P. Travers Steains stated at the inquest that he made a *post-mortem* examination, which showed that the cause of death was disease of the heart accelerated by excitement. The verdict of the jury was in accordance with this opinion.

Joy caused actual death, according to Hume, at the restoration of Charles II. Dr. Rush says there was a time when he doubted the truth of this assertion, "but," he adds, "I am now disposed to believe it, from having heard of a similar effect from an agreeable political event in the course of the American Revolution. The door-keeper of Congress, an aged man, died suddenly, immediately after hearing of the capture of Lord Cornwallis's army. His death was universally ascribed to a violent emotion of political joy. This species of joy appears to be one of the strongest emotions that can agitate the human mind" (lxi. p. 132). In this case and in the following, it is more than probable that death was the result of cardiac and not cerebral mischief.

"A curious and sombre incident is reported from the gaming-table of Köthen, in the Principality of Anhalt. A middle-aged man entered the room and sat down to play. After a run of great luck, his winnings had augmented to the sum of a thousand ducats—equal to nearly five hundred pounds sterling—which the croupier pushed over to him. The fortunate gambler did not appear very anxious to have the gold and notes, and made no response when he was asked if he wished to continue playing. One of the servants of the establishment touched him upon his shoulder to draw attention to the unheeded winnings, and to the croupier's question, but the man remained strangely immovable; and when they came to look closer, they found that he was dead. He had 'passed' like the red! *Rien ne va plus* had proved true of himself, as well as of the last roll of the ball. Was it his good luck that had been too much for him? A thousand ducats is a pretty sum, the thought of which varies, doubtless, in proportion to the state of the pocket—but it seems hardly adequate to kill a man under any circumstance. At all events the gambler was dead—some sudden 'click' in the mechanism of life had spoiled the works and made the subtle pendulum of being stop in its mid-

swing. Even such a grim comment upon the worship of Mammon did not take away his presence of mind from the chief priest of the temple. The croupier no sooner perceived that Death had backed 'zero' and won, than he raked the dead man's gold and billets back into the bank, declaring that a corpse could have no engagement or rights. The heirs of the defunct gamester are not satisfied with this axiom, and have commenced an action for the recovery of the sum." (*Daily Telegraph*, March 7, 1870.)

We have spoken of the influence of the lachrymal secretion as an outlet for emotional excitement. When this is arrested, the bodily organs, as is well known, suffer, and the heart appears to be the first to receive the shock; cases of death are on record which appear to be referable to this cause.

In cases of exclusively cardiac paralysis the balance, as Dr. Richardson would put it, between the heart and lungs is broken on the circulating side, and we may have the illustration he adduces, that of cardiac apnoea, in which this disturbance of the normal equilibrium is exhibited. The respiratory apparatus intact and in full play, the patient breathes into lungs almost anæmic, and the tissue is more or less injured. "In one case of sudden death from this affection," he observes, "I found the bloodless lungs as white as milk, and so infiltrated with air as to distend the chest-walls, and to resist being emptied of air by the firmest pressure of the hand" (xlv., Feb. 2, 1867).

In some cases of death from emotional excitement, it is impossible to be certain that the heart has been the first organ to suffer; but it may be deemed highly probable in the following instances.

Several years ago a man named Filbey, died at Twickenham, after witnessing the death of a neighbor. I am indebted to Dr. M. Ward, who attended him, for the following particulars of this case, which, with its accompaniments (four deaths in all), was tragical enough:

Dr. Ward was called in on February 17, 1870, to a Miss H—, residing next door to Filbey. He found she had been suffering for several days from fever, but had been out up to the day before. She had only returned, a few days, from attending the funeral of a sister who had died of typhus. The symptoms became rapidly worse, and she died the same night. Filbey himself, who was a butcher, came for Dr. Ward shortly before her death. During the night (3 o'clock) the doctor was called up to

see a sister of Miss H——, who was suffering from hysteria. Dr. Ward saw Filbey at the house; he appeared to have been drinking somewhat, but talked rationally, and made the remark, "I suppose it is only what we must expect from the shock she has received." Mrs. Filbey sat up with the patient, and Filbey himself went backwards and forwards between this house and his own, during the night. He appeared quite well, though depressed, and remarked, "I have never seen any one dead before, and hope I never shall again." Between 6 and 7, his wife came in and found him dozing in his arm-chair by the fire; he conversed with her and she asked him to have some tea, but he seemed more inclined to sleep, and she left him and went to bed herself; his daughter, however, an intelligent child of eight, remaining with him in the room. About 7.30 A.M., she found her father was slipping down in the chair, and called the cowman to lift him up, who came in and did so, and then left. An hour after, Dr. Ward was sent for and found Filbey quite dead, sitting in an arm-chair with his feet on another. His face was calm and he looked asleep; the extremities were cold, but not rigid. The daughter had been in the room the whole time and had not observed any change. Dr. Ward, assisted by two other medical men, made a careful post-mortem examination thirty hours after death, and could find nothing whatever to account for death. He says he never examined a more healthy body. Both ventricles of the heart contained a little fluid blood, the heart itself being normal in size and very firm in structure; its structure was not examined microscopically. The brain and cord were examined and found quite healthy, without appearing drained of blood; they were not at all congested. The stomach, which contained a little brandy and water, was healthy, as were all the other organs; "in fact," adds Dr. Ward, "we could not decide from what the man had died, but I gave it as my opinion that he had died from a sort of gradual syncope, produced by the fright, aided by the sitting posture. I certainly never met with a similar case, though I have often noticed the susceptibility of butchers to the sight of human blood, or on the occasion of any sudden illness." He appears to have been a tolerably steady man, but when he took too much was greatly excited and even dangerous. He had suffered from idiopathic tetanus years before, since which he had enjoyed good health. To wind up this tragedy, at the time of

Filbey's death his wife was expecting to be confined in about a month, and after apparently recovering well from the shock, commenced flooding in about a fortnight, and died undelivered on the day three weeks after her husband's death; a case of typhus fever being the first of this series of unhappy events.

The *Medical Times and Gazette*, of July 28, 1866, under the head of "Death from Fear of an Operation," reports a case of death from apprehension; the more remarkable because the sufferer appeared to be in nowise a nervous person:

"A distinguished veterinary surgeon, about sixty years of age, of good constitution, and possessed of great moral force, had suffered for a considerable period from multiple stricture of the urethra and a highly irritable bladder. After the urine had become purulent and ammoniacal, the presence of four calculi was ascertained. In the hopes of being able to perform lithotrity, M. Cazenave persevered for a considerable time in an endeavor to relieve this painfully spasmodic condition of the urethra. These attempts were most courageously borne by the patient, but he was excessively disappointed when informed that lithotrity, which he was very desirous of undergoing, was out of the question, and that some form of lithotomy was the only operation that was eligible. Of this he was known to entertain a great dread, but nevertheless, at once gave his consent to its performance, retaining to all appearance his habitual calmness. The patient having been placed and held in position by the assistants, M. Cazenave was on the point of introducing the catheter, when the patient, who had exhibited entire calmness and serenity during the preparations, was observed to become pale and faint, and in the course of ten minutes, in spite of all that was done, he died."

Dr. Currie, of Edinburgh, engaged to perform *paracentesis abdominis* in the case of a woman laboring under ascites. On entering the room the patient fainted. On attempting to restore her, he found she was dying. "She died of a sudden paroxysm of fear" (lxi., ii. p. 114).

Recently (1883) a young woman, aged 18, was frightened to death at Blockley, by a practical joke, as stupid as it was criminal. She was a laundress, and being employed at Forest Hill, she walked to and from that place night and morning, passing on her journey a lonely road by the Deptford Cemetery.

One evening she arrived home looking very ill and excited. In reply to questions, she said she had been frightened by a man with a white choker round his neck and over his mouth, who flew out at her by the cemetery. She then drew a chair up to the table to have some supper, fell forward with her head on the table, and after a short struggle expired. A medical man, Mr. Wallace, was called in, who arrived a few minutes after her death. At the autopsy he found all the organs healthy, except the heart. He writes to me (August 4, 1883): "There were thickening of the aortic valves and slight contraction; the left ventricle was very full of blood. The mitral valve was healthy. There was a large deposit of fat on the heart. I found the stomach distended with beef-steak pudding of a very inferior quality."

The verdict of the jury was "Death by syncope, due to shock to the nervous system." Strange to say, there was no rider commendatory of the perpetrator of the joke and the murderer of the unfortunate woman.¹

That the first effect of such a shock would be violent palpitation of the heart there can be little doubt: exhaustion of nerve force conveyed to the accelerators would follow, and the unrestrained inhibitory action of the vagus would stop the heart; or if, as seems possible, emotion may act equally upon the vagus and sympathetic, the cessation of its pulsations would occur from the exhaustion following the excessive discharge of centres with which both are in relation.

The next case is not so much an illustration of the influence of the Emotions as of Expectant Attention, and would have been more appropriately inserted at p. 112 of this work, as a fitting practical commentary upon the singular death, at an expected hour, of a young lady.

An American lady, Miss Bonney, residing at Aven, N. Y., became impressed with the conviction that her spirit was to leave the body for a time and then return. She succeeded in convincing several of her friends that this phenomenon would actually occur. She complained of no illness, but one day announced

¹ In the absence of legal punishment, we endorse the comment of the *Daily News* upon this case: "It is ardently to be hoped that the joker may fall into the hands of a stronger than he, armed with a sufficient stick and skilled in its use. Such a one should assuredly not spare for the crying of the hardened fool, who makes himself a nuisance to a neighborhood, and who in this case has brought grief to a respectable family."

that the time had come for her departure, and after tea she took to her bed, while she remained calmly conversing with several friends until midnight. She was seen several times between that hour and two o'clock. At this time she exclaimed "Oh! this is glorious," and ceased to breathe. There was no struggle, and no evidence of pain. Her friends, of course, regarded the event as a fulfilment of her prediction. Miss Bonney's remains were kept unburied from the 10th November to the 5th January, in the expectation of the return of her spirit. Then a coroner's inquest was held upon her decomposed body, and her death officially notified. There was a post-mortem examination, and no cause of death could be discovered, but, considering the interval which had elapsed, no importance could be attached to this.

A friend of mine vouches for the truth of the following. At Thornton, near Pickering (Yorkshire), two sisters lived (apart), both centenarians. The younger was taken ill, but said "She could na dee before oor Hannah," and recovered. Hannah died, and the doctor went from her to visit her sister. "Well, doctor, and what brings you here this morning; is it to see oor lass?" (her daughter-in-law, aged 75, who lived with her). "No," replied the doctor, "I came to say your sister is dead." "At, do ye say oor Hannah has died, then I'll just go and dee too." She went up stairs, lay down, and expired the same afternoon.

The story of the sudden death of the betrothed of James Dawson, a Jacobite officer, executed in April, 1746, is thus related in a letter of the time cited by Professor Morley (*First Sketch of English Literature*, p. 830). It must be premised that it was expected he would be pardoned, and his wedding was fixed for that day; instead of this his *fiancée* witnessed his execution. "She got near enough to see the fire kindled which was to consume that heart which she knew was so much devoted to her, and all the other dreadful preparations for his fate, without being guilty of any of those extravagances her friends had apprehended. But when all was over and she found he was no more, she drew her head back into the coach, and crying out 'My dear, I follow thee! Sweet Jesus, receive both our souls together!' fell on the neck of her companion, and expired the very moment she was speaking." No doubt she died from the heart, the emotional strain being followed by collapse, aided by the desire to die.

We are not aware that in any work on Forensic Medicine,

the question is discussed whether death can arise from Chagrin. That it is one of practical importance may be seen from the following case, which appeared at the time it occurred in the *Gazetta Med. di Torino*, Jan. 27, 1858, and the *Medical Times and Gazette*, Feb. 22.

A station-master of one of the Italian railways, 55 years of age, and in robust health, was awakened one morning with the news that his station had been robbed. He felt his responsibility so acutely that he immediately became ill, and died within twenty-four hours, all the assurances of his superiors and the encouragement of his relatives failing to reassure him. There were utter prostration, spasmodic action of the stomach, with obstinate vomiting, hollow voice and failing pulse; consciousness continuing to the last.

The railway administration, in a circular to its *employés*, narrated the facts, and offered its homage to the honorable susceptibility manifested by the deceased. It was also determined that his widow was entitled to a pension, her husband having met with his death as an immediate consequence of his service. The railway being in the hands of the Government, the court whose duty it was to carry out this decision demurred, and ordered that the widow should only be paid an indemnity of 1944 *lire* (£80). She appealed against this as an unjust judgment, and the case was referred to Signor Laura, Professor of Legal Medicine in the Turin University, to report upon. This he does at some length, but we can only present his chief conclusions:

1. That sudden mental emotion may induce death within a brief space of time, or even immediately, and even in persons in robust health, is a fact freely admitted in science.

2. The physical phenomena induced by such moral cause, indicate a profound perturbation of the nervous system, and are generally of a dynamic character.

3. The intimate connection of the mental emotion and the fatal result, in this case, is shown by the facts, that the evening before the patient was perfectly well, and when awakened from a tranquil sleep by the dreadful news he immediately became ill. No other possible cause could be assigned for the train of symptoms that followed, as the action of his heart prior to this illness was known to have been healthy.

4. The fact of death being delayed for twenty-four hours is no

proof that it was not caused solely by the mental emotion. In analogous cases, such as death from lightning or from poison, death, usually sudden, may be delayed in some individuals. Mental emotions may not operate with the same force, and may meet with a varying amount of resistance, and there are also various conditions operating, which the present state of science does not enable us to appreciate correctly. It is very possible that had the news been brought to the patient during the time when his mind was occupied with his duties, in place of when just waking from sleep, his powers of resistance would have been greater.

Professor Laura's conclusion therefore was, that the man had undoubtedly died solely from mental emotion, induced by his great anxiety for the safety of the property, no preceding or accompanying cause of death being present. The court of appeal agreed in this opinion, which was also approved by the faculty of Bologna, *and the pension was decreed to the widow as if her husband had been killed while performing services for the company.*

Bloodvessels.—Passing from the heart to the muscles by which the supply of blood to the body is regulated, we find them to be strikingly influenced by emotional states.

Fletcher (lxxiv. p. 256) records a case of "Bellows-sound of the arteries from irritable brain," in which, "on the application of an uncommonly severe mental irritant, the stream of blood passed loudly, like a rushing torrent through the vessels." The sound, however, "floated sometimes softly like a gentle stream, then in bounds or jets synchronous with the action of the pulse, over the cavities of the trunk, from the abdominal aorta to the arch in the chest and both subclavians." The patient was a lady of forty-six. The ailments of this person—originally a spoilt child—appear to have been misunderstood. She made an unhappy marriage. "Disappointment fell heavily. Every feeling was certainly not now indulged; perhaps few, or probably she expected too much. Something, too, might be said concerning a certain green-eyed monster and his fatal and malignant sway in married life." She eventually became insane. Mr. Fletcher refers the sound to a "strictured" condition of the vessels, but it is more likely to have arisen from the state of the blood, or from a relaxed condition of the vessels. "Arterial relaxation with murmur," observes Dr. B. W. Richardson, "is the result of

injury involving the emotional or organic nervous centres. I have seen it follow a direct physical injury, and I have seen it follow a mental shock as distinctly. It is a common result of intense grief, and is characterized by sudden changes of vascular tension, coldness, chills, frequent perspirations, irregular actions of the bowels, and often diuresis. But the most distressing symptom of all is the arterial murmur. This is usually heard by the patient [this was so in Mr. Fletcher's case], and is sometimes mistaken for aneurismal tumor. It is produced at those parts of the arterial tract where an artery runs through a rigid canal, as through the abdominal opening of the diaphragm, or the carotid canal in the base of the skull. In rigid canals, the arteries being relaxed, the sides of the vessels press, with each impulse of the heart on the surrounding resisting wall. Thus, there is vibration, and murmur is painfully audible to the patient. In these cases the symptoms are often developed in the most sudden manner, and recovery, again, is often as equally sudden" (xxi., Oct. 1869).

Mr. Fletcher gives another interesting case, of which the following is a condensed report:

A lady, when young, experienced an extraordinary degree of fright from a fall from her horse. It was a fortnight before the nervous system at all recovered from the shock. There is no doubt, however, that subsequent moral causes had a share in the full development of the case. The anomalous sounds were preceded and accompanied by a sensation in the lower part of the bowels which resembled the crawling of worms. The sound consisted of a musical bellows-sound from the descending aorta, which the patient not inaptly called "the chimes." The sound was composed of an irregular succession of musical tones, just as the varying breeze gives melody to the *Æolian* harp; or it resembled the sighing of the wind through a chink in a door, or notes drawn at random across the string of a violin. It would then die away into silence, and be no more heard until some causes of mental agitation or sudden motion of the body would reproduce it. About the same period was occasionally heard a musical sound proceeding from the left carotid in the shape of an octave, running regularly upwards. Standers by, without a stethoscope, could distinctly hear it (lxxiv. p. 323).

The following, omitted in the section on the influence of the

intellect on the vessels, is of interest in this connection: M. Gley, in a thesis written in 1881, entitled *Etude expérimentale sur l'état du pouls carotidien pendant le travail intellectuel*, states that he finds increased frequency of cardiac beats according to the intensity of the attention, and at the same a dilatation of the carotid artery and a more marked dirotism of the carotid pulse, while in the radial the phenomena are reversed. He contends that these results are not dependent on changes either of cardiac activity or the respiration, but of vaso-motor influence (*Archives de Neurologie*, 1882, p. 246).

I had hoped to obtain some valuable illustrations of the influence of emotion on the bloodvessels from Mosso's plethysmograph, but the instrument requires such delicate manipulation to avoid error, that it appears to be unsafe to draw any inferences at present from its use.

The attention directed, during the last few years, to the muscular tissues of the bloodvessels and to the vaso-motor nerves, has thrown great light upon the long-observed fact of the influence of Emotion upon the vessels. The pallor induced by Fear, the crimson blush of Shame,

"O Shame! where is thy blush?"

and the flush of Rage (analogous to the turgescence of the comb in the game cock and turkey), are psycho-physical phenomena universally recognized, and indicate the remarkable local vascular changes caused by various feelings of the mind, independently of the general disturbance of the circulation which emotional excitement may produce, by acting, as already described, upon the heart itself. The influence of the emotion on erectile tissues belongs to the same class; in fact, the increased action of the heart and rapidity of the general circulation may, in this instance, prove actually antagonistic to local hyperæmia. Claude Bernard's demonstration of two circulations—the cardiac and the capillary—the latter being directly controlled by the nervous system, and acting "separately upon each individual spot of the body," is applicable here. It helps us to understand how some parts of the system may remain in their ordinary condition, while others are morbidly affected or exhibit certain physiological phenomena. Blushing may be referred to as a typical example of the momentary paralysis or suspension of that vaso-motor nerve

influence which induces the ordinary contraction of the capillaries; such suspension of the contracting power by an emotion being followed by congestion of the vessels of the face. Opposite emotions, according to the same theory, either stimulate the contractors of the minute vessels, or simply permit their action by suspending the antagonizing cerebral influence.

Fear of bad news of Collatinus alternately flushed and blanched the cheeks of Lucrece :

"O how her fear did make her color rise,
First red as roses that on lawn we lay,
Then white as lawn, the roses took away."

So human is blushing that, as Darwin says, "It would require an overwhelming amount of evidence to make us believe that any animal could blush" (xev. p. 311). He mentions three cases of very young children blushing. Two were under three; one was four; as might be expected, idiots rarely blush. Sir James Paget, at Darwin's request, observed carefully the extent of blushing, and never found it pass below the upper part of the chest; rarely as low as the collar bones and shoulder-blades; but one instance is recorded of the whole body blushing from shame. It appears, although the evidence among travellers is somewhat contradictory, that there is no race of men in which blushing does not occur.

The remarkable relation between certain moral feelings and blushing has ever attracted attention, and various explanations have been attempted. Darwin has exhibited much ingenuity in proving that the fundamental element in the acquirement of the habit is the attention paid to personal appearance, and not to moral conduct, the contention being that primæval man, prior to his acquiring much moral sensitiveness, would be very sensitive about the appearance of his body. The face being the part most regarded, any sense of shame in reference to it would be accompanied by a desire to conceal it, and the wish to restrain it would aggravate the tendency in this region by the concentration of the attention thither. Regard for the opinion of others is, in accordance with the same explanation, the fundamental principle as respects blushing from purely moral causes.

Language derives several figurative expressions from this *irce*, of which the German word for blushing—*schamröthe*—is

a striking example. In our own language there is no corresponding term, but the man who might seem never to have blushed in his life, and one thinks never will, finds, when charged with a shameful act, no stronger expression for the denial of it, than "I should *blush* to do it."

Increased vascularity under the influence of Emotion, chiefly when sudden, frequently causes extravasation or rupture of the small bloodvessels. Such cases must not, of course, be confounded with those in which violent contraction of the voluntary muscles occasions injury to the vessels imbedded in their tissue, and consequent effusion of blood. As vascularity, whether with or without extravasation of blood, forms one of the prominent signs of inflammation, it follows that the illustrations given, will more or less merge into examples of an inflammatory condition of the part, attended by swelling, tenderness, and heat. In all, however, the influence of mental states upon the bloodvessels is exhibited.

In illustration of the influence of Fear or apprehension upon the vascular system, I shall first give the following example,¹ the case of a highly intelligent lady well known to myself. Although the emotion had for its object another person, it none the less acted upon her own system :

One day she was walking past a public institution, and observed a child, in whom she was particularly interested, coming out through an iron gate. She saw that he let go the gate after opening it, and that it seemed likely to close upon him, and concluded that it would do so with such force as to crush his ankle; however, this did not happen. "It was impossible," she says, "by word or act to be quick enough to meet the supposed emergency; and, in fact, I found I could not move, for such intense pain came on in the ankle, corresponding to the one which I thought the boy would have injured, that I could only put my hand on it to lessen its extreme painfulness. *I am sure I did not move so as to strain or sprain it.* The walk home—the distance of about a quarter of a mile—was very laborious, and in taking off my stocking I found *a circle round the ankle, as if it had been painted with red-currant juice, with a large spot of the same, on the outer part.* By morning the whole foot was inflamed, and I was a prisoner to my bed for many days."

¹ See also Manual of Psychological Medicine, 4th edition, p. 229.*

A very similar experience is related by Dr. Marmise, of Bordeaux, of a lady's maid who was present when her mistress was bled, whom she had assiduously nursed for a long time. She experienced so powerful an emotion, that at the moment when the surgeon put his lancet into the patient's arm, she felt in the bend of the elbow the sensation of a prick, and shortly after there appeared an ecchymosis at this spot (*Union Médicale*, 1862).

A very interesting example of a local affection, caused by an excited imagination, is reported by Tissot, on the authority of Hoffmann. A man believed that he saw and was seized by a spectre, and was terribly frightened. One of his feet immediately became red and swollen, and afterwards suppurated. He became also convulsed and delirious. It is not stated distinctly whether he fancied the spectre seized him by the affected foot. If such was the case, the narrative would derive additional interest from the circumstance that the site of the bodily affection was determined by, and corresponded to, the locality imaged in the mind. The fact, in any case, remains, that fright produced inflammation and suppuration of one of the feet (xxxv., Sept. 1865, p. 164). The same authority records the case of a young man who was thrown into a passion, upon which his left ankle became swollen and painful. The knee also was similarly affected afterwards.

Fear during sleep is stated to have caused local inflammation corresponding with the image present in the mind in a dream. In the *Bibliothèque choisie de Médecine*, by Planque, tome vi. p. 103, is the following case: A man, thirty years of age, healthy and robust, saw in a dream a Pole with a stone in his hand, which he threw at his breast. The vivid shock awoke him, and then he found that there was on his chest (*dans le même endroit*) a round mark, having the appearance of a bruise. Next day there was so much swelling, etc., that a surgeon was requested to see it, who, fearing a slough, scarified the part, and relieved it. The wound healed in a short time. Without more definite information, it would not be safe to build a theory upon this case, but looking at the previous one of the spectre, and others equally well authenticated, there appears no reason to doubt that the dream and the inflammatory action of the skin stood in the relation of cause and effect. Had there been anything incredible in the dream acting as a cause, we might have thought it possible that the man had unawares received a blow, the previous day, in

the region of the bruise, and that it had suggested the dream. Its admission as evidence must then be determined by the authenticity of other examples, whether occurring when a person is awake or during sleep.

A powerful mental impression produced, in the following instance, physical effects corresponding in their locality to those anticipated in another person :

In the *Medical and Surgical Journal*, May, 1835, a case is recorded "as having happened in France, in the practice of M. Diez, a French surgeon, of a lady, who is designated as Madame G—, aged 24 years, whose lips and mouth became suddenly enormously swollen, from having seen a child of a few years old pass the sharp blade of a knife between its lips without even cutting itself, which intumescence it required the usual applications to subdue, and which is represented to have had an appearance similar to that produced by the sting of a wasp, or some other poisonous insect, which there was no possibility of having occurred. This case is curious, as the organ affected was the same as the one for the apprehension for which, in the child, the nervous horror was experienced. How nature acted in this case it is, of course, impossible to suppose" (xli. p. 51).

In a case recorded by Lauzanus, mental excitement from a slight cause produced signs of local vascular disturbance; probably mere Attention, without an emotional state being aroused, would have hardly sufficed to do so. A young woman witnessed the lancing of an abscess in the axilla, and not only did she immediately experience pain in that region, but this was followed by inflammation and a decided swelling (lx. p. 154).

It may at first sight seem an extraordinary, almost incredible thing, that the action of the emotions should produce congestion in any clearly circumscribed spot, that spot being determined by the direction of the thoughts at the moment; but facts of the same kind, though less striking in their results, are familiar to all. Thus, no one would regard it as remarkable that on picturing one's self in a dangerous position—the foot, for instance, caught in a man-trap—the limb should start spasmodically, or experience a sensation of discomfort or actual pain. Yet so simple a phenomenon involves the same principle as the other more striking fact—the localization of thought or emotion in the

body, indicated by some external signs more or less marked according to the age, sex, constitution, or health.

Although repeating what has already been said in the chapter on the influence of the Intellect upon the involuntary muscles, we may observe that the fundamental principle upon which the class of phenomena now under consideration depends is this: that the mere circumstance of thinking of any part of the body, whatever may be the exciting cause, tends to augment the local afflux of blood, and innervation. Motion or sensation, or both, occur in the locality to which the thoughts are directed; but this effect is greatly intensified if accompanied by a powerful emotion.

Simple as this law is, it does, in fact, embrace and explain numerous facts which appear at first sight inexplicable, or to require more complete explanation.

Thus, if I see an injury done to the limb of another, my thought is turned to it, and by an inevitable association of ideas, based, in this case, on the far-reaching law of self-preservation, it is also directed to my own limb, and naturally to the corresponding one. Hence some effect is almost sure to follow—whether slight, or so decided as to leave its mark upon the tissues, or cause intense pain, must depend upon the force of the impulse conveyed from the brain, and the sensibility of the individual's system.

The evidence which can be adduced to establish a concurrent affection between the same limb or region of our own body as that of another person upon which our imagination is riveted, is confirmed by the movements, *not* hidden from the view, which we instinctively perform. Thus, if we observe a man receive an injury to any part of the body, we frequently apply our own hand to the corresponding part of our own body. It may be said this is the consequence of a sensation of a painful kind experienced by ourselves in the part. Possibly, but if so, the explanation is itself a proof of the position we seek to maintain; if, on the other hand, these *external* movements constitute an independent series of facts, it may be inferred from the relation existing between the vivid image in the mind of a certain person's limb, and his corresponding member, that a like relation may exist between the former factor and *internal* movements. In this connection it is also curious to observe how constantly it happens that, without the occurrence of any accident calculated to direct the attention strongly to a particular limb of another person, we assume the

attitude of the person we are conversing with. A places his arms akimbo; B automatically does the same. A scratches himself; B follows his example. Hence the contagion of bad habits; hence the importance of good example. But the bearing of these every-day facts upon the subject under consideration is simply this: if there be so marked a change in the outer man corresponding with another person's condition, there is no reason to doubt an analogous change in the inner man. Call it imitation, or sympathy, or imagination, or what you will, the power which it exercises is so obvious in those parts of the body which can be seen, that we can have little difficulty in inferring changes from the same cause in those parts which cannot be seen. If A's hand is instinctively placed on the breast when he sees B plunge a dagger in his, there is every reason to believe that there may be hidden movements in the muscular coat of the vessels, not less definite, and resulting from a common law.

The influence of emotions on the bloodvessels aids in determining a rise of *Temperature*, as we have seen to be the case in purely intellectual operations (see p. 124). The experiments of Dr. Lombard are available here also. Poetical and prose compositions of an emotional character were employed by him to arouse the feelings. He found that their influence on the temperature of the head showed itself more quickly and in a more marked manner than in intellectual exertion. As in the previous experiments each region of the head was tested separately, the areas selected for examination being the same as in the corresponding experiments (see p. 126 of this work).

Dr. Lombard also found that emotional activity, like intellectual work, causes a rise of temperature different in all three regions of the head; that less difference exists in the rapidity and degree of rise of temperature in different regions in emotional activity than in intellectual work, but that the order of the regions, with regard to the comparative degree of rise of temperature is, so far as the three spaces in question are concerned, the same in both cases (xci. p. 177).¹

¹ Dr. Lombard believes that all the higher degrees of rise of temperature at the surface of the head, during both intellectual and emotional activity, are "in part owing to vascular disturbance." The rise of temperature of nearly 0.9° F., observed by M. Broca after ten minutes' reading aloud, would appear to be partly due to the above cause (note, p. 202).

The effect of moderate anger on temperature was examined in four instances, in the same individual, the examinations being made when the first intensity of passion had subsided, and indignation had succeeded. The quickened circulation and respiration had subsided, and the color of the face was not heightened. In one instance nothing definite was observed; in the other three the results were well defined. These are tabulated most minutely, and are too elaborate to be introduced here. As an illustration, however, of the results obtained in one experiment we give the following figures.

Examination of 3d district, 3d tier, anterior region, left side.

+ Signifies rise of temperature above starting-point.

Time from commencement of work.	Deflections of Galvanometer.*	Thermometric Values, Fahr.	Mental condition.
—	—	—	—
At the end of— 0 minutes	0°	0°	Commenced mathematical work.
15 "	+ 12°	+ 0.0432°	Work interrupted and sub- ject greatly annoyed.
17 "	+ 10.5°	+ 0.0378°	
19 "	+ 12°	+ 0.0432°	
22 "	+ 15°	+ 0.054°	Annoyance disappearing.
25 "	+ 16°	+ 0.0576°	
26 "	+ 15°	+ 0.054°	
29 "	+ 13°	+ 0.0468°	Annoyance completely gone, and work resumed.
31 "	+ 12°	+ 0.0432°	
33 "	+ 12°	+ 0.0432°	
37 "	+ 11.5°	+ 0.0414°	

In this experiment the rise of temperature above starting-point was only 0.0378° on the work being interrupted, but it rose from annoyance to 0.0576°, being an increase of 0.0198° in the eight minutes of its continuance.

In one case the subject was "much vexed" and the temperature which had been raised in the first place by conversation, was further and decidedly increased by vexation, the increase being 0.0432° F. It should be observed that after the complete disap-

pearance of the mental disturbance, the temperature still remained above its first level, falling only very slowly (xci. p. 205). Dr. Lombard observes that from these and other experiments, "it would seem not unlikely that the comparative effect on the temperature of different spaces of anger and vexation follows a similar rule to that usually applicable to intellectual work and the particular kind of emotional activity which we have principally studied" (p. 207), and he summarizes his general conclusions by saying that "all parts of the surface of the head—even when taken in small subdivisions—show an increase of temperature during all kinds of mental work; but that some parts are usually more active in this respect than others; although here, again, the different parts seem to be able to supply each other's places—the commonly less active part not infrequently superseding its ordinary superior" (p. 208).

Of course, a question of great interest arises here, namely, how far the temperatures of points of the outer surface represent the temperatures of points of the convolutions beneath? Dr. Lombard's reply is, that while there is no certainty that the relative temperatures of small subdivisions of the outer surface represent with exactitude the relative temperatures of the underlying tracts of brain surface, it is highly probable that in the larger areas "the relative elevations of temperature, during mental exercise, do represent with considerable correctness the relative degrees of functional activity of the corresponding underlying portions of brain surface" (xci. p. 209).

Sir James Paget observes that "Habitual or very frequent coldness of the feet probably indicates a contraction of the small bloodvessels dependent on disorders of nervous supply. For the phenomena are very variable. Some patients have such feet as, they say, cannot be warmed; they are cold all night, cold while lay wrapped in warm flannel; and even when warmed, they may become cold under mental influence. But in some the feet, after being cold all day, flush in the evening; in others they become red, and even painfully hot, puzzling the student of diagnosis. Such variations, in the state of the bloodvessels in any part, seem to tell of nervous disorders overrunning from the cerebro-spinal into the vaso-motor system." "Many sensitive persons shiver at very slight provocation; for instance, when they are in pain or anxious. . . . In hysterical persons, a shivering may take the

place of an ordinary hysteric fit. . . . Mere nervous excitement may raise the temperature to at least 101° " (xlix. p. 197).¹

The occurrence of hemorrhage in the brain and lungs in connection with emotional excitement, may here be briefly referred to.

RUPTURE OF VESSELS OF BRAIN.—The stimulating influence of Emotion on the cerebral vessels, short of rupture, is witnessed in cases in which the surface of the brain is exposed by accident. One is recorded in the *Medico-Chirurgical Review* (No. 46, p. 366). A robust young man lost a considerable portion of his skull. "When excited by pain, Fear, or Anger, his brain protruded greatly, so as sometimes to disturb the dressings, which were necessarily applied loosely; and it throbbed tumultuously, in accordance with the arterial pulsations." In such a state, it is easy to understand an apoplectic sequence. Vaso-motor spasm may also cause rupture of the vessels.

In March, 1870, a case of apoplexy from Fright and Anger occurred at Bradford, for the particulars of which I am indebted to Dr. Bell. A man who had previously threatened violence to some persons in the house where a woman lived, threw a stone against one of the windows. This woman, aged 56, nimbly came up from the cellar, went across the road to make inquiry, crossed to her own house again, complained of her hand feeling numb, went upstairs, threw herself upon the bed, and became insensible. This occurred about 7 p.m. Dr. Bell saw her at 9 p.m., when he found the right side, but not the face, paralyzed. The patient occasionally opened her eyes and looked about. Died about 2 a.m., seven hours after the attack. *Autopsy*, eighteen hours after death. "Very fat. On opening the head, the superficial vessels were found very full of black blood; and on removing the brain there were several ounces of bloody serum about the medulla oblongata. On slicing there was seen a large pitchy black clot equal to size of fist in left middle lobe, opening into left lateral ventricle, between corpus striatum and optic thalamus, bursting through septum lucidum into right ventricle and filling it with bloody serum. The descending cornua of both lateral ventricles were filled with bloody serum, which had also burst through the base of the brain. Nothing apparently amiss with

¹ Dr. Bechterew, of St. Petersburg, has made a number of observations on the temperature of the insane, showing its fall in various forms of insanity; even great mental excitement (*St. Petersburger Medicinische Wochenschrift*, 1879, 1881).

the medulla. The left ventricle of the heart was considerably hypertrophied and contracted; no disease of the valves or aorta; did not notice any disease of the vessels of the brain, but suppose such must have been the case, and that an unusually powerful heart, suddenly acting upon weakened cerebral arteries, caused their rupture. She had been remarkably healthy. Nothing unusual was observed about her immediately before she ran upstairs."

In May, 1873, a well-known stockbroker in Paris, M. Rodriques, fell down in a fit which proved to be apoplectic, dying a few hours afterwards, under the following circumstances. The body of a man was found in the Bois de Boulogne, shot through the head. This was found to be the *valet de chambre* of M. Rodriques, and it was on communicating the fact to his master that the fatality occurred.

John Hunter adduces, as an instance of "mental emotion" inducing apoplexy, the case of "the person who invented or applied the steam engine to the sailing of ships, and who, when it was before the Committee of the Society of Arts and Sciences, was taken at once with an apoplectic stroke, of which he died in about twenty-four hours" (*Posthumous Papers*, vol. i. p. 264).

In the *Lancet*, of Nov. 16, 1867, occurs a good example of the influence of Joy succeeding Anxiety in inducing death, recorded by the registrar of Preston, Lancashire. The subject was a female, aged 43, the wife of an overlooker. It appears that the daughter of the deceased was travelling by railway when a collision occurred, which caused injury to a large number of passengers. Alarming reports concerning the accident had reached the mother as she was waiting at the station for her daughter, who soon after arrived *unhurt*. The transport of joy, supervening on a state of mental anxiety, was more than her physical organization could bear. The mother, after clasping her child in her arms, fell down in a fit and expired twelve hours afterwards. In the medical certificate the case was returned as "apoplexy." It recalls the observation of Haller that "excessive and sudden Joy often kills by increasing the motion of the blood, and exciting a true apoplexy."

Dr. Rush, in his essay "On the Influence of the Revolution upon the Human Body," states that more instances of apoplexy occurred in the city of Philadelphia in the winter of 1774-5,

than had been known in previous years. He says, "I should have hesitated in recording this fact, had I not found the observation supported by a fact of the same kind, and produced by a nearly similar cause, in the appendix to the practical works of Dr. Baglivi, Professor of Physic and Anatomy at Rome. After a very wet season in the winter of 1694-5, he informs us that 'apoplexies displayed their rage; and perhaps some part of this epidemic illness was owing to the universal grief and domestic care occasioned by all Europe being engaged in a war. All commerce was disturbed, and all the avenues of peace blocked up, so that the strongest heart could scarcely bear the thoughts of it. The winter of 1774-5 was a period of uncommon anxiety among the citizens of America. Every countenance wore the marks of painful solicitude for the event of a petition to the throne of Britain, which was to determine whether reconciliation, or a civil war, with all its terrible and distressing consequences, was to take place. The apoplectic fit which deprived the world of the talents and virtues of Peyton Randolph, while he filled the chair of Congress, in 1775, appeared to be occasioned in part by the pressure of the uncertainty of those great events upon his mind. To the name of this illustrious patriot several others might be added, who were affected by the apoplexy in the same memorable year" (lxi., i. p. 131).

In many cases of death from emotional excitement it is impossible to determine, from the absence of particulars, whether lesion of the heart or brain has been the cause of the fatal result; as for example with Isocrates, to whom Milton's lines refer:

"As that dishonest victory
At Chæroneæ, fatal to liberty,
Killed with report that old man eloquent."

Did he die of apoplexy or "a broken heart?" It is impossible to say.

RUPTURE OF PULMONARY VESSELS.—Descuret records the case of a woman, aged 64, subject to violent fits of passion, in one of which "her little eyes sparkled, her face was injected, her large jugulars were distended, and a violent fit of coughing brought up, in my presence, bloody expectoration of a bright color." She was relieved by bleeding, etc.

Under this head falls the story told of a Doge of Venice, Francis

Foscari, who, in 1457, died suddenly from hæmoptysis on hearing the bell of St. Mark's announce his successor (Sismondi and Daru, vol. i.).

Dr. Sweetser cites from Broussais the case of a lady, "who on feeling a living frog fall into her bosom from the claws of a bird of prey, whilst she was sitting on the grass, was instantly seized with such a profuse bleeding from the lungs that she survived but a few minutes" (xliii. p. 28).

BLOODY SWEAT.—The rupture of the cutaneous capillaries, or the transudation through their walls of blood so as to occasion "sanguineous perspiration," should be enumerated here among the results of emotional excitement.

I can, however, only refer to one well-marked case of the kind—that of a "sailor, aged 30, who was so alarmed by a storm that he not only fell on the deck speechless, but on going to him, Paulini observed large drops of perspiration of a bright red color on his face. At first he imagined that the blood came from the nose, or that the man had injured himself by falling; but on wiping off the red drops from the face, he was astonished to see fresh ones start up in their place. This colored perspiration oozed out from different parts of the forehead, cheeks, and chin; but it was not confined to these parts, for on opening his dress he found it formed on the neck and chest. On wiping and carefully examining the skin, he distinctly observed the red fluid exuding from the orifices of the sudoriparous ducts. So deeply stained was the fluid that on taking hold of the handkerchief with which it was wiped off, the fingers were made quite bloody. As the bloody perspiration ceased, the man's speech returned" (lxxi. p. 61).¹

Before passing from the bloodvessels, we should notice the brilliancy of the eye caused by certain emotional states, as joy; partly due to tension of the muscles of the eyeball, but also to the heightened vascularity.

There are several references to the appearance of the eyes under the influence of anger in the *Iliad*.

¹ The interesting fact has recently been recorded by Mr. Frank Buckland, in *Land and Water*, that a hippopotamus, being excessively savage after her confinement, perspired profusely, the perspiration being the color of blood. Professor Gulliver found on examination that it contained numerous blood-corpuscles.

The appearance of the eye in fierceness and fear is beautifully described in "Rokeby:"

"Hiding his face, lest foemen spy
The sparkle of his swarthy eye."

Scott remarks on these lines, "After one of the recent battles, in which the Irish rebels were defeated, one of their most active leaders was found in a bog in which he was immersed up to the middle, while his head was concealed by an impending ledge of turf. Being detected and seized notwithstanding his precaution, he became solicitous to know how his retreat had been discovered. 'I caught,' answered the Sutherland Highlander, 'the sparkle of your eye.' Those who are accustomed to mark hares upon their form, usually discover them by the same circumstance" (Canto iii., Stanza iv.).

Of Augustus it is said that, "like Apollo, his eyes were clear, and he affected to have it thought that they possessed some divine irradiation, and was well pleased if when he fixed his eyes upon anybody, they held down their eyes as if overcome by the glaring brightness of the sun."

THE IRIS.—The influence of Emotion upon the iris is shown in Terror by the widely dilated pupil. Gratiolet calls it the pathognomonic sign of this emotion. "Son disque noir semble quelquefois avoir envahi le cercle entier de l'iris; l'œil semble regarder alors dans des ténèbres profondes. Une pupille contractée ne convient pas à cette passion" (xv. p. 379). Here it would seem that the action of the sympathetic nerve supplying the radiating fibres of the iris, is allowed full sway by the temporary suspension or paralysis of the function of the antagonizing cerebro-spinal nerve (third nerve), induced by the shock of fright. It may be noted that the modern doctrine respecting the antagonism of sympathetic and cerebro-spinal nerves, has sprung from a study of the supply of nerves to the radiating and circular fibres of the iris from these two systems, "the phenomena which take place in vessels being assimilated," as Bernard observes, "to those which occur in the iris" (1872); contraction of the radiating fibres of the iris answering to the contraction of the capillaries; that of the circular fibres to their active dilatation. Thus, Terror dilates the pupil because it allows the sympathetic free play upon certain muscular fibres of the iris, and induces pallor

by allowing the sympathetic to contract the superficial capillaries.

Mr. J. W. Clark (see p. 67) informs me that he has been making observations on the dilatation of the pupil in two dogs, and that he has not the smallest doubt that fear causes dilation of the pupil. The fear of falling and the fear of being beaten induced it. Other forms of excitement, however, appear also to cause dilatation. Another gentleman, who has observed the effects of emotion on the pupils of his parrot, says its pupils dilate with pleasure and contract with displeasure.

Dr. Wilks, to whom I recently applied for any observations he might have made on his historic parrot,¹ writes to me under date Feb. 22, 1883: "I have long observed the eye of my parrot. It is constantly vacillating; when frightened and angry the pupil is contracted, when good tempered it is dilated. When being stroked and pleased, the pupil widely dilates. It has long been known in my house as the 'benevolent eye.'" In the human being I have thought that the same fact is to be observed. I have made inquiries among friends, and I have found that the thing is known to certain persons—that pleasurable emotion will cause dilatation of the pupil. I am assured that the entry of a gentleman into a room where there is a lady who has a penchant for him, will cause an expression unmistakable to another woman, and that part of this is due to the dilatation of the pupil. I think Balzac may be admitted as a master of physiognomy, and he says the same.² He speaks of a girl at church, concentrated upon religious acts, putting on an angelic look with large pupils. I am now inquiring of artists in reference to the old Italian devotional pictures, whether any peculiar state of the pupils is apparent. If belladonna is named, as it is said to be, from its rendering a woman beautiful by dilating the pupil, it is clear that it is a condition admired, and therefore must belong to the better

¹ See Journal of Mental Science, July, 1879.

² "Veronique était changée pour quelques instants. La prunelle de ses yeux, douée d'une grande contractilité semblait alors s'épanouir et repoussait le bleu de l'iris que ne formait plus qu'un léger cercle. Ainsi cette métamorphose de l'œil devenu aussi vif que celui de l'aigle, complétait le changement étrange du visage. Était-ce l'orage des passions contenues, était-ce une force venue des profondeurs de l'âme qui agrandissait la prunelle en plein jour, comme elle s'agrandit ordinairement chez tout le monde dans les ténèbres, en brunissant ainsi l'azur de ces yeux célestes?"

emotions, and, on the contrary, a contracted pupil would be disliked, because in all probability associated with bad temper and evil passion. Physiologically, the condition is interesting as implying a passive state—a blissful repose or ecstasy in distinction to the contracted pupil of strong mental action. Surely a painter would know whether he would make the pupil different in a madonna, adoring angel, or in such an eye as Millais gave Gladstone.

THE SKIN.—Cutis anserina and horripilatio (observe its synonym *horror*) are the well-known effects of emotional excitement, especially Fear, on cutaneous muscle. The former so familiar to all, finds a poetical illustration in Joanna Baillie's lines:

"Yea, when the cold blood shoots through every vein;
When every hair's-pit on my shrunken skin
A knotted knoll becomes, and to mine ears
Strange inward sounds awake, and to mine eyes
Rush stranger tears, there is a joy in Fear."

The latter is no doubt assisted by the action of the occipito-frontalis in producing constriction of the scalp, but this could not cause the phenomenon of "the hair standing on end" without the contraction of the involuntary muscular fibre surrounding the roots of the hair.

"Why do I yield to that suggestion
Whose horrid image doth unfix my hair?"

Eliphaz and Æneas alike afford familiar illustrations of this phenomenon. Fear came upon the Temanite when he saw in his dream a mysterious, unearthly figure, and he says that as it passed before him, "the hair of my flesh stood up." The Trojan, frightened by the shade of Creüsa, tells the same story, "obstupui, steteruntque comæ."

On the erection of the hair, Darwin, as usual, has many interesting remarks. "These appendages (hairs, feathers, etc.) are erected under the excitement of Anger or Terror; more especially when these emotions are combined or quickly succeed each other. The action serves to make the animal appear larger and more frightful to its enemies or rivals, and is generally accompanied by various voluntary movements adapted for the same

¹ See also article in Brain, April, 1883, and Dr. Wilks's Diseases of the Nervous System, 2d edit., 1883.

purpose, and by the utterance of savage sounds." After giving examples in the chimpanzee, orang, gorilla, the lion, cat, dog, elk, goat, bat, cock and hen, swan, owl, hawk, etc., Darwin proceeds, "We thus see how generally throughout the two higher vertebrate classes, and with some reptiles, the dermal appendages are erected under the influence of Anger and Fear." "The movement is effected, as we know from Kolliker's interesting discovery, by the contraction of minute unstriped involuntary muscles, often called *arrectores pili*, which are attached to the capsules of the separate hairs, feathers, etc. . . . The erection of the hair is, however, aided in some cases, as with that on the head of a man, by the striped and voluntary muscles of the underlying *panniculus carnosus*. It is by the action of these latter muscles that the hedgehog erects its spines" (xcv. p. 101).

Darwin regarded this action as at once incidental and non-incidental; purposeless and purposeful. Thus, after saying that "it must be looked at when occurring under the influence of anger and fear, not as a power acquired for the sake of some advantage, but as an incidental result, at least to a large extent, of the sensorium being affected," he qualifies this statement by "it seems hardly credible that the coördinated erection of the dermal appendages, by which the animal is made to appear larger and more terrible to its enemies or rivals, should be altogether an incidental and purposeless result of the disturbance of the sensorium. This seems almost as incredible as that the erection by the hedgehog of its spines, or of the quills by the porcupine, or of the ornamental plumes by many birds during their courtship, should all be purposeless actions" (xcv. p. 102).

The influence of Fear in making the hair stand on end is recognized by Sophocles:

"There was silence for awhile;
But sudden he was summoned by a voice
That made our hairs all stand on end who heard it,¹
Some deity so loud and often called,
'Thou Œdipus'—"

ŒD. COLON., v. 1694.

Grief is said to have the effect of making curly hair straight; this result being due to a cause of a different kind—deficient

¹ "ὥστε παντας ὀρθίας
Στήσαι φοβῇ δεισαντὸς ἐξαίφνης τρίχας."

vigor of the nutritive processes. Indeed, it is difficult to speak of the changes which take place in the hair from Emotion without confounding several distinct causes. We may, however, refer to the marked effect on Expression induced by the motion of the moustache from the play of the muscles beneath in Anger, etc. This is assisted by the greater mobility of the upper, as compared with the lower lip.

TRACHEA AND BRONCHI.—Here should be enumerated cases of spasmodic croup and spasmodic asthma when excited by emotional causes; "nervous cough," occasioned by anxiety or nervousness, might be added. Public speakers frequently suffer from this annoyance *before* speaking, but are quite free from it when once they commence. This is not to be wondered at when even so experienced an orator as Mr. Bright said only the other day, that he never came to a public meeting to deliver an address without "fear and trembling." We have already trenched upon this section when speaking of the spasm of the larynx (p. 233), and merely adding that dyspnoea is notoriously induced or aggravated by emotion, we pass on to affections of the alimentary canal.

ŒSOPHAGUS, STOMACH, AND INTESTINES.—As regards loss of motor power, it may be observed that emotional shock does not cause paralysis in the course of the alimentary canal so frequently as in that of the respiratory tract, but doubtless many instances do occur. Romberg, speaking of paralysis of the œsophagus, remarks that it has been occasionally observed associated with dumbness or aphonia as a result of violent mental emotion, and refers to the works of Joseph Frank (*Prax. Med.*, vol. i. p. 126).

Under this head some cases of hysterical tympanites might be given. One will be found in the *Medical Times and Gazette* for December 10, 1859, in which the disorder was certainly of emotional origin, although not the immediate result of mental shock. Dr. Anstie observes that psychical influence in such cases probably acts through the splanchnic nerves. The course of their action beyond the thoracic sympathetic and towards the cerebro-spinal centre, is not certainly known. Petrowski believes there are two motor systems for the intestines, the circular fibres supplied by the pneumogastric; the longitudinal supplied by the splanchnic (*Biennial Retrospect*, 1865-66, *New Syd. Soc.*).

Digestion is affected by the contractions of the muscular coat of the stomach as well as by the amount and character of the

gastric juice, and therefore the disturbance of this process which so often results from emotional changes is due, in part, to abnormal contraction of these muscular fibres. Dr. Carpenter cites from Brachet the experiments upon the pneumogastric nerve in which, "some hours after section of the nerve on both sides, the surface only of the alimentary mass was found to have undergone solution, the remainder of the mass remaining in the condition in which it was at first ingested," and he observes that "the moderate excitement of pleasurable emotions may be favorable to the operation, not only by giving firmness and regularity to the action of the heart, and thence promoting the circulation of the blood, and the increase of the gastric secretion, but also in imparting firmness and regularity to the muscular contractions of the stomach" (viii. p. 408).

A clergyman informs me that once, on the receipt of distressing news, he labored under spasmodic action of the stomach for three days, causing violent vomiting for two or three hours at a time. He was unable to take food, and there was no action of the bowels.

Of the influence of Emotion in increasing the peristaltic action of the intestines, the ordinary effect of Fear and Fright affords the readiest illustration. The simple result of this muscular contraction—the discharge of the contents of the bowels—is rarely unmixed with increased secretion from the intestinal glands, and therefore we shall have to return to the consideration of these effects when we speak of secretion and excretion. It must be noted here, however, that the involuntary muscular fibres of the gland-ducts which discharge themselves into the alimentary canal are acted upon and contribute to the resulting diarrhœa.

Illustrations of metaphoric language derived from the connection between the emotions and the viscera have already been given in the chapter on Sensation, but we may add here one (rumination) having more particular reference to muscular action. Thus, Shakespeare, in "Henry VI.:"

"I may revolve and *ruminate* my grief."

ACT V. SC. 5.

This appears to be the proper place to refer to those cases of icterus, which probably arise from spasm of the gall-duct. Dr. Watson says, "Certainly the *pathemata mentis* play their assigned

parts; fits of Anger and of Fear, and of alarm, have been presently followed by jaundice. . . . Mr. North witnessed a case in which an unmarried female, on its being accidentally disclosed that she had borne children, became in a very short time yellow. A young medical friend of mine had a severe attack of intense jaundice, which could be traced to nothing else than his great and needless anxiety about an approaching examination before the Censor's Board at the College of Physicians. There are scores of instances on record to the same effect." Dr. Watson seems inclined to connect the icteric and mental symptoms with spasmodic constriction of the gall-ducts, and does not adopt Mr. Mayo's suggestion that jaundice in such cases is due to the influence propagated through the nerves causing the formation of bile in unusual and rapid amount in the blood (lxxii., ii. p. 557).

Shakespeare recognizes the truth of the occurrence of icterus in consequence of mental states, in the "Merchant of Venice."

"Why should a man, whose blood is warm within,
Sit like his grandsire cut in alabaster?
Sleep, when he wakes? and creep into the jaundice
By being peevish?"

ACT I. SC. 1.

Probably peevishness would be more likely to cause jaundice by acting directly on the secretion of the liver than by causing spasm of the gall-duct.

In the *British Medical Journal*, for Nov. 19, 1870, is the report of a case of "Jaundice after Anxiety," by Mr. T. Churton, of Erith.

"A married lady, æt. 30, had an attack of jaundice, October, 1868, after mental and physical fatigue. The ordinary remedies were used, the nitro-muriatic acid being the most useful, but the discoloration persisted for some weeks. Six months afterwards she had another attack, which appeared to arise from similar causes. She had several visitors staying in the house, and having little inclination for society, was somewhat disturbed by attending to them, and by the addition to the ordinary cares of the household. In the midst of this anxiety, one of her children, subject to asthma, had a severe attack one evening, and was in considerable distress all night. Next morning at five o'clock I found her sitting up in bed, rocking to and fro, and complaining of acute pain in the hepatic and gastric regions. Pulse 72; temperature 98.4°. She showed slight but unmistakable symptoms of hysteria

—quivering eyelids, etc. Ten grains of bromide of potassium were given, therefore, every four hours. The first dose cured her of all pain at once. On the following day, however, I found her completely jaundiced, and the urine of a dark brandy color. The bromide was continued, but less frequently, and an aperient given. Next day the jaundice was less intense. Two days after, the yellowness had entirely gone, and the urine was of a natural color."

Mr. Churton adds, "I do not pretend that the aperient pill had nothing to do with this rapid recovery, but, on the other hand, we know how little purgatives avail in such cases. Neither do I think they would have availed anything in this case, had not that condition of the nerve-centres upon which (no matter how) the jaundice ultimately depended, been first, as it were, neutralized by the bromide. Nevertheless, I should have laid little stress on a single case, but that Mr. Jessop, of Leeds, to whom I am indebted for the suggestion of this plan of treating nervous jaundice, tells me that he has several times used the bromide with equal success."

URETERS, BLADDER, AND URETHRA.—We shall only notice here the familiar effects of Fear, etc., in causing spasm of the expulsor muscle of the bladder and inducing urgent micturition. The following is given by Romberg as an example of spasm of the bladder from the fear of approaching death: "A Judge of the Criminal Courts related to me that a man, convicted of highway robbery and murder, who was executed some years ago in the town, before mounting the scaffold, prayed to be allowed to gratify the urgent desire to micturate." He adds, "Even certain mental impressions are capable of inducing a greater inclination to frequent contractions of the vesical muscles, as in other instances they affect the muscular fibres of the rectum. We occasionally meet with hypochondriacal patients who think of nothing else but the state of their evacuations. I have had a gentleman of this description under my care, who always remained in the vicinity of his house when he took a walk, in order to be able at once to follow the call of nature. There was another who had heard that the formation of calculus could be prevented by frequent micturition; after the impression had ceased to harass him, he was still often reminded of it by an annoying sense of strangury" (xxxiv., ii. p. 31).

Sir James Paget was consulted in no less than four instances, within the fortnight following the demise of Napoleon III., by persons who experienced sensations of stone in the bladder, without there being any calculus, probably from spasmodic action of the viscus (xlix.).

UTERUS.—Under this head we shall only refer to the fact familiar to every general practitioner—the influence of violent emotion in causing miscarriage, and of arresting uterine contraction in labor. Hence, if an accoucheur leave his patient and another take his place, the progress of labor is generally impeded; uterine contraction ceasing for hours. Yet medical men often strangely forget the importance of avoiding unpleasant mental impressions under such circumstances. I have known an accoucheur, devoted to natural history, improve the occasion by coolly bringing out of his pocket an adder which he had just secured in one of his country walks. I believe the patient did not find the exhibition so useful as to make her particularly desire to have the same medical attendant again.

In a case recorded by Professor Laycock (iv. p. 112), Attention and emotional excitement combined, brought on uterine pains in a female, æt. 48, who was attending her daughter during a very tedious labor.

Dr. Gooch records the case of a lady whom he attended, who with great difficulty was persuaded to marry, in consequence of an imagination that she would certainly die should she become pregnant. Such was the influence of this apprehension upon the course of the labor, that, in spite of all the encouragement Dr. Gooch gave her, it interfered with its progress in so marked a manner as to protract it to a period of thirty-six hours.

The death of the Princess Charlotte, acting on the imagination of women similarly circumstanced, injuriously retarded labor in many instances. Dr. Gooch's practical conclusion is, "In this state of mind we must keep up the spirits of our patient, both during pregnancy and at the time of labor, by anecdotes of the most favorable accouchements of those who have entertained equal apprehensions, and by every species of encouragement in our power" (*A Practical Compendium of Midwifery*, p. 181).

CHAPTER X.

INFLUENCE OF THE EMOTIONS UPON THE ORGANIC FUNCTIONS.

THE emotions powerfully excite, modify, or suspend the Organic Functions, causing changes in nutrition, secretion, and excretion, and thereby affecting the development and maintenance of the body.

We have in the consideration of the influence of the emotions upon the heart and bloodvessels anticipated, to some extent, the principles which underlie the phenomena of organic life referred to in this chapter. The important part played by the vaso-motor nerves has been dwelt upon, chiefly in connection with the vascularity of the skin, which so manifestly results from emotional excitement. The circulation of the blood through the various organs of the body being affected by the same cause, the action of the emotions in inducing well-marked changes in nutrition and secretion is not extraordinary. The question which arises, whether these variations in the circulation of the blood in the organs and tissues adequately account for the alterations in nutrition and secretion which follow, has already been fully considered, and the conclusion been arrived at, that varying mental states may act upon these processes directly through the nerves as well as through the capillary circulation.

BLOOD.—Pleasurable emotions, by their influence on the heart and respiration, favor oxygenation of the blood; and we are all conscious of the

“Sensations sweet
Felt in the blood, and felt along the heart.”

depressing emotions producing the contrary effect.

Not that we suppose sensation to be actually appreciated by the blood, but that the sensation which is undoubtedly experienced has its seat in the walls of the vessels, that is, is vaso-sensory.

The direct influence of emotional excitement upon the blood

itself has been supposed to be exhibited in the case recorded by Hunter: that of a man who died in a fit of passion, and in whom it was found fluid, but more proof is required that the two stand in causal relation. Dupuy's experiments on animals (after being hunted), adduced to show that mere rapidity of the circulation diminishes the fibrin in the blood, have not been confirmed by more recent observers. On how many occasions does active bodily exercise in man inordinately quicken the circulation, without any bad effect as regards the blood! Dr. Wilks (xlv., Feb. 1, 1868) observes, "We hear sometimes of fear turning the whole mass of the blood. I believe this is literally correct. I have seen now so many cases of anæmia, some of them fatal, occurring upon a severe shock of the nervous system, that I have no doubt of the fact." He then refers to the *modus operandi*, but frankly confesses his ignorance until physiologists will inform us in what part of the body the blood is manufactured. Those who explain everything by the varying calibre of the bloodvessels, would fully admit that mental states influence, not only the amount of the blood in a vessel during a given period of time, but also thereby its chemical composition. Cl. Bernard tries to prove, experimentally, how the nervous system controls (and therefore how Emotion may influence) the absorption of oxygen by the blood in the lungs, and its combination with the histological elements of the tissues. As his experiments on the relation of secretion to the blood prove that, during this process, the blood in the veins of the glands, which is usually dark in color, becomes of a bright arterial scarlet, and as he accounts for these phenomena by the opposite action of the two classes of nerves—the contracting and dilating—which supply the vessels—results which may be artificially induced by *section* and *galvanism*; it follows that even if we go no further than Bernard's mechanical views, varying emotional states would affect the relative amount of oxygen and carbonic acid gas in the blood. As the transformation of the effete materials of the tissues, taking place in the capillaries, requires time, and therefore a certain stagnation of blood for the operation, if the emotions interfere with this condition, it is easy to see that there will be a tendency for arterial blood to pass unchanged into the veins, as actually occurs when the sympathetic nerve is divided. Changes of psychical origin in the quantity and quality of the blood, and consequently in

secretion and nutrition, may thus receive at least a partial explanation by our application of Bernard's experiments. Increase of temperature, and thereby of certain chemical phenomena, must also be included. That changes in the chemistry of the blood may, however, be produced in a more direct manner is, to say the least, very probable.

The question of the changes produced in the blood by certain conditions of the mind, obviously bears upon the alleged *influence of the mother upon the embryo*. While the evidence in regard to it is far from being so complete as we could wish, it is certainly sufficient to raise a strong presumption in favor of the action of mind upon blood in this instance. If the effects are granted, the inference that the blood is the channel through which they are produced appears the only legitimate one, so long as no anatomical proof is forthcoming that there exists any connection between the nervous system of the mother and the fœtus in utero. Since Bichat wrote, nothing has been discovered to disprove his position that "it is by the modifications which the mother's blood receives from vivid emotions that we must explain their influence upon nutrition, the growth, and even the life of the fœtus, to which the blood is supplied through the placenta" (li. p. 43).

What may be the extent and character of this influence, is, however, a question on which much difference of opinion exists, and many appear unable to see any alternative between admitting all the absurd stories about "mother's marks," and denying maternal influence altogether.

A few cases recorded by medical observers may here be briefly alluded to, for the purpose of illustrating the point at issue.

1. In the *Lancet*, of November 7, 1868, Mr. Child, late House-Surgeon of Charing Cross Hospital, recorded a case illustrating, he considers, the influence of "maternal impression." The child was born August 26, 1868, and was naturally formed, as regards the body, except the nails on the thumbs, which were like those of a rabbit. "The parietal, frontal, and part of the occipital bones were wanting; and at the space corresponding to, but larger than the anterior fontanelle, was the brain, entirely denuded of skin or membrane, not even being covered with arachnoid. There was a little hair over the eyes, none elsewhere." The eyes, palate, and tongue were similar to those of a rabbit." Mr. Child then found that during the second month of pregnancy the

mother went to a penny show, in which she saw a trained horse pull the trigger of a pistol, pretending to shoot a rabbit. A dummy was then thrown out; the back of its head was bleeding, having to all appearance been shot off. This corresponded, as the mother-in-law declares, to the mark on the child's head. The patient seems never to have forgotten the circumstance during the remainder of her pregnancy, and was considerably frightened at the time.

2. In the *Lancet*, of August 17, 1867, Mr. T. Smith, Surgeon to St. Bartholomew's Hospital, in a paper on "Mother's Marks," observes that "one cannot doubt that these marks occasionally appear on children in connection with mental impressions received by the mother during pregnancy." He then adds: "I will show you a striking case that came under Mr. Paget's observation. This child was admitted into St. Bartholomew's Hospital, in 1865. She was at that time twelve years old. The left upper extremity and the greater part of the corresponding side of the trunk and neck were deeply stained with dark-brown pigment, from which grew an abundant crop of brown, harsh, lank hair, varying in length from one to two inches. The skin was rough and harsh; the arm was long, thin, and withered; the scapula was unnaturally prominent. In fact, the upper limb, shoulder, and back, bore a very strong resemblance to the corresponding part of a monkey. The mother stated that when three months pregnant with the child, she was much terrified by a monkey attached to a street organ, which jumped on her back as she was passing by." Mr. Smith concludes his report with the remark, "I need scarcely say that such a case does not stand alone. There are many well-authenticated cases where marks, and even bodily deformities in the fœtus, can be fairly attributed to strong and persistent mental impressions in the mother."

I am indebted to Dr. A. J. Alliot, of Sevenoaks, for the following case:

B. Mrs. A— is the wife of one of the officers at a large country asylum. J. W— is a patient in the same asylum, working in the stores, and disfigured by a large nævus patch, of a fiery-red hue, which covers the whole of the right side of the face. Mrs. A—

d, of course, frequent opportunities of seeing this man at the day Chapels, and on other occasions; during her last pregnancy she entertained a feeling of horror and disgust at his ap-

pearance. On the child being born, the first question she asked was, "Is he marked at all like that man?" (J. W.) The answer was "No, as far as can be seen at present." On examination the next day, however, a distinct nævus patch of the size of a three-penny piece was observed on the left upper eyelid, and later on, several nævus growths on the vertex and back of the head, from the size of half a crown to a shilling; the child (a female) has at present a thick head of hair, so that these patches are well concealed. Mrs. A. had a tedious recovery after her labor, and told me she had been fretting herself so much about this man's appearance, that she thought about it night and day. Her other children, two girls and a boy, are of a fair skin and quite free from any blemish.

Cases like these would appear to countenance the conclusion that the Imagination of the mother, united more or less with Emotion, produces corresponding effects upon the unborn child. The number reported by various medical men is large, and undoubtedly deserves consideration. The shallow objection that such effects of the maternal imagination are impossible, is easily, and (for this reason) frequently made. On the other hand, it must be admitted that these reports ought to be received with great hesitation, not from there being any reason to doubt the good faith of the reporters, but on account of the peculiar liability which obviously exists to color the facts, and make them square with a preconceived theory.

Coincidence may fairly be allowed to explain some of these occurrences; what more likely, for instance, than that out of the considerable number of children born hydrocephalic or acephalic the mother of one should attend a fair, see an exhibition of monstrosities, and be affected disagreeably during the time of her pregnancy?

Further, it must be borne in mind that there are a very large number of instances in which accoucheurs have carefully noted the expectations of the mother before delivery, without the slightest fulfilment of such expectations in any corresponding bodily affection of the child.

Thus Dr. Fisher, in the *American Journal of Insanity* (Jan. 1870), says that during twenty years he has made a practice of asking his patients whether they expected any deformity in the child, and by far the larger number expressed their fear of such a result,

and frequently specified the nature of the deformity; and yet only two cases of malformations occurred during this period, and these did not appear to be in any way connected with the longings, etc., of pregnancy. He speaks of twelve hundred cases, and maintains that Dr. Hammond has failed to prove his position that maternal states cause malformations. Hunter also made inquiry in two thousand cases before the birth of the child, and failed to find in a single instance any connection between a mental emotion in the mother and an abnormal development of the child.

However, although we may not be prepared to accept the evidence in favor of the production of special marks in the foetus answering to definite mental images in the mother, it is probable that a serious mental disturbance of the latter will indirectly affect the nutrition of the former.

The effects of emotion on nutrition being necessarily of a general character, their phenomena do not strike us in the same way as do the changes in the nervous and vascular systems produced by the same agency, but they are not the less real, as may be seen by the bodily contrast between the man who spends his life in tranquillity and the man who passes it in mental misery.

Bichat (writing in 1800) recalls and contrasts the time when Fear, Sadness, and the desire of revenge seemed to hover over France, with that in which security and abundance excited the gayety so natural to his countrymen, and points to the difference in the exterior aspect of their bodies in proof of the influence of the emotions on nutrition. I know several interesting examples of the same influence as the result of the late war in France.

A lady informs me that at Tours many lost their health, and some died from fright. A young lady was standing with her father at the window when the Prussian soldiers came down the *tranchée*, and was seized with shivering; her father, who could feel her trembling, said, "You need not be frightened, they will not hurt you;" but she had received a shock from which she became quite blanched, and lost her sleep and flesh. She has not yet fully recovered her strength, and remarks that she has never been able to keep her feet warm since that day (1872).

Dr. Boggs, in a letter to the *Lancet*, dated June 21, 1871, writes: "The only hope of the Parisians which they fondly cherished, and which, in a great measure, kept them alive during the seige, was most cruelly blighted, and you may imagine their disappointment

when the capitulation of the city was announced; the mental shock to some was such that they almost lost their reason. . . . But the most remarkable effect of the siege was the aged appearance of some of the inhabitants; men and women alike seem to have passed over at least ten years of their existence in half as many months. A friend of mine, a distinguished practitioner in this city, nearly fifty years of age, has become so gray and wrinkled, and such other changes have taken place in his constitution, as to give him the appearance of a man of sixty."

The influence of a violent and painful emotion on nutrition is well shown in the following well-told case:

"Returning from a professional visit late one evening, I was met by a medical friend who begged me to see with him a gentleman whom we both had previously well known, stating that he was in a deplorable state and wished to see me. I at once consented, and we walked on together. 'You have, of course,' said he, 'heard of his unfortunate accident.' I said I had heard some vague reports of his having shot some gentleman accidentally. 'Alas,' said he, 'that was not all. You must remember him, one of the handsomest young men in the University.' I said, Yes. 'Wait until you see him now; he is truly a victim to mental distress; his form is reduced to a skeleton, and his strength scarce that of an infant's. The circumstances are these: He was spending the shooting season at his uncle's, in —shire, when his cousin, to whom he was much attached, about his own age, and an only child, irritated him by some frivolous remarks while on a shooting excursion; words ran high on both sides, and they being only attended by a little boy of ten years old, who could not interfere, a struggle ensued, in which the poor victim we are going to see, shot his cousin on the spot. He then returned, scarce conscious that he did so, to his uncle's house, detailed the events, from the effect of which within a month he saw his uncle and aunt carried to their graves, while he exists a miserable wreck, soon to follow them.'

"Such as he was described I found him: his hand was hot and feverish; his cheek pale and withered, and his frame a perfect skeleton; his voice was deep and hollow; and his expression agonized and wretched, yet he complained of nothing. It was clear that his nervous circulation was suspended; yet his thinking principle was awake and consciousness alive. The mental or

nervous stimulant was withdrawn, having by the shock of the accident been directed into another channel, which was necessary to keep in activity the animal functions, and a general stagnation ensued, until exhausted nature sank from inanition" (xli. p. 50).

Of the disastrous influence of disappointment in love in causing malnutrition in the form of pulmonary disease, I may refer to the case of a young lady, the daughter of my old French master M. de M—. I avail myself of the graphic pen of a well-known writer, "Holme Lee," to describe this case, and shall not apologize for introducing so florid a sketch into a medical work :

"There is his grave, and his darling Vic's close by it, in the quiet churchyard behind the arches of the Abbey, tufted greenly over; but to-day all white and daisied with the spring. What a bright face it was, that face of Vic's, which just faded and faded and died away from the sun, in the very prime of the morning! Here is a picture of a brilliant August day out of doors; but in the Professor's study all is grave and quiet, and the long table is cleared for the incoming class. There is sturdy little Fan, just on a comfortable level with her books; and pretty Vic, who has attained to the dignity of helping her father, seated with her back against the light, and the roses of her cheeks all in full glow under the shadow of the dark grape-clusters of her richly tinted hair. She rests her elbows on the big dictionary, and props her dimpled chin in the palms of her wee white hands, on one finger of which gleams an emerald ring—symbol that her heart is given away and her maiden promise plighted already. The door opens, and two scholars enter with mysterious air and abrupt news. 'There's a wedding at St. Olave's this morning; have you heard of it, Vic?' cries one. 'We always thought you and Willy were engaged; did you really break off when you quarrelled? It is that widow! she has nothing but her money. I would not care if I was you, Vic; he was never worth caring about!' And then the chatterer subsides into a frightened silence, *for out of Vic's face away the roses and the sunshine, as if the hand of Death had passed it and turned it to clay. Not a word breathes from her white lips; only stir with a dumb, fluttering pathos, while a blank gaze steals her beaming hazel eyes and quenches their lustre forever.* No one saw Vic smile again. She does not help her father that g, and he is a little testy over our lessons; he will have low shut, sultry as it is; for we can hear the wedding-

bells ringing at St. Olave's while we are gathered at our work. Her mother has told him hurriedly Vic is not well, and he must do without her, and he is fidgety and fretful that anything should ail his darling and he not know why. He will know why soon enough—soon enough!

“And this is a day in the fall of the leaf. The chill October winds have begun to blow, and Vic is sitting by our parlor fire, at home, talking to my eldest sister very seriously and sadly, myself listening with an awed, silent sympathy to the old, old story she is telling; I fancy I can hear her still! ‘Yes, they had quarrelled, but had made it up again, and she thought it was over; he kissed her the last time they said good-bye; they were quite friends. Oh, yes, quite friends! She had no more idea of his leaving her, and marrying anybody else, than she had of the Minister falling! Her grief would kill her, *is* killing her—her heart is broken,’ she says; speaking not in her old, sweet voice, but in such a querulous, sharp accent as might thrill from the chords of some fine instrument when overworn and jarred all out of tune. She had her pretty caprices in her happy days, and perhaps by practical people she may be considered a little fantastic and sentimental now; but by-and-by every adverse tongue is hushed, for it begins to be whispered amongst us *that she is going off in a decline*. And before the snow-drops come again she is gone” (*In the Silver Age*, 1866, p. 140).

Hunter considered that nothing shows the influence of the Mind upon the Body more strongly than the effect of maternal anxiety in a hen when hatching. “A hen shall hatch her chickens, at which time she is very lean; if those chickens are taken away from her she will soon get fat, but if they are allowed to stay with her she will continue lean the whole time she is rearing them, although she is as well fed and eats as much as she would have done if she had had no chickens” (*Posthumous Papers*, vol. i. p. 261).

Care, it is said, will kill a cat; and its effect, as regards man, is too patent to need illustration. As pointed out by Fletcher, the convict may grow fat even on prison fare, simply because his doom is sealed and he has no anxiety. When considering the influence of the emotions upon the bloodvessels, we showed that all the signs of those changes in nutrition which are comprised under the term “inflammation” may be so caused. We proceed

now to give illustrations of definite lesions of nutrition, as observed in the changes which frequently take place in the *skin* and *hair*.

As, without actual disease, we see the influence of mental causes upon the functions of the skin, Fear checking perspiration, and other emotions causing temporary congestion, it is not surprising that definite eruptions should occasionally have a similar origin. The transition to eczema, impetigo, etc., may be difficult to understand, but is it not possible?

Mr. Hutchinson informs me, in connection with his experience at the London Skin Hospital, that patients frequently attribute the affections of the skin under which they labor to fright and other moral causes, but I have not been able to obtain any statistics. The relation between some cutaneous diseases and the distribution of nerves bears upon this subject. The instance of shingles has been already referred to in connection with the nerves engaged in nutrition. When severe neuralgia is followed by herpes in the course of the affected nerve, we can hardly doubt the possibility of distress of mind occasioning this cutaneous disorder, though we cannot prove it.

A lady, of an exceedingly sensitive and irrepressible nature, on one occasion when a gentleman visited her house experienced a very uncomfortable sensation so long as he was present, and observed a spot or sore on his cheek. Two days after, a similar spot appeared on her cheek, in the same situation. So reports the late Professor Gregory (xix. p. 507). I see nothing impossible in this; at the same time, it can hardly be admitted, if a solitary example, to prove the influence of mental states on the skin.

Ovid gives expression to a similar notion when he says:

"Dum spectant oculi laesos, lædantur
Multique corporibus transitione nocent."
DE REMED. AMORIS, lib. ii., v. 320.

"Viewing sore eyes, eyes to be sore are brought,
And many ills are by transition caught."

Cazenave, when enumerating the causes of skin diseases, remarks that "strong mental emotions, and Grief in particular, exercise a remarkable influence." Speaking of impetigo, he says that Grief and Fear sometimes produce the disease. Bateman

mentions two cases in which great alarm and agitation of mind caused this affection.

In his lectures, M. Biett used to relate to his pupils several cases which showed this influence. In particular he referred to a striking example exhibited in a very severe form of *lichen agrius*, occurring within twelve hours of the receipt of unwelcome intelligence. In the *Medical Times and Gazette*, July 13, 1867, the case is reported of an engineer, who, treated for syphilis, from which he remained free for six years, became, a week after hearing of the fall of a bridge he had built, the subject of "syphilitic impetigo of the scalp and beard." Gratiolet observes that Melancholy dries up the skin and induces a number of herpetic affections.

Guislain mentions two cases bearing on this subject; one in which a woman, who had seen her daughter violently beaten, and was much frightened, suffered in consequence from gangrenous erysipelas of the right breast; the other in which a woman, æt. 24, saw her brother die, and was greatly affected. A wen which she had on the head became gangrenous in a few days. "L'odeur qui s'en dégagait le décélait suffisamment" (*Leçons Orales*, p. 166).

In connection with the influence of the emotions upon nutrition, its generally recognized effect in inducing cancer should be mentioned, a predisposition in the system being probably necessary. Descuret reports the case of a young woman who had cancer of the breast requiring operation, which he attributes to the maleficent action of Jealousy, Hatred, and Chagrin (lxvi. p. 621). Romberg says he attended a lady, æt. 40, whose right mamma had four years previously, after violent mental excitement, become attacked with scirrhus, which was being gradually developed (xxxiv., i. p. 150). Such examples must, however, be received with great hesitation. Their mental origin requires the confirmation which can only be derived from very many more instances.

HAIR.—The influence of Grief or Fright in blanching the hair has been generally recognized.

"For deadly fear can Time outgo,
And blanch at once the hair."

It has been a popular rather than a physiological belief that this can occur "in a single night." No one doubts that the hair

may turn gray, gradually, from moral causes, and this is sufficient proof of the mind's influence upon the nutrition of the hair. I have known alterations in the color of the hair (brown and gray) corresponding to alternations of sanity and insanity. Some entertain doubts as to sudden blanching of the hair, but I do not believe them to be well founded, and will give in illustration the following interesting case which occurred in the practice of my late friend Mr. W. P. Cocks, of Falmouth:

Thomas W—, about twenty years of age, the son of a milkman, was tall, fleshy, good-looking, slightly bronzed, hair intensely black, stiff, wiry, and rather inclined to curl. His general appearance was that of a healthy and well-formed man, used to light work, but much exposure in the open air. One of his thoughtless companions told him (what was not true) that a young woman in the town was going to swear before the magistrate, on the morrow, that he was the father of her child. Poor W— was dumbfounded. The announcement had given his whole frame a severe shock; the gall of bitterness had entered his heart, and the mind was under the baneful influence of its power. He hastened home, and sought relief in his bedroom. Sleep was denied him, for his brain was on fire. He saw nothing but disgrace coming from every angle of the room. Such was the mental agitation produced by a silly trick! Early morning brought no relief; he looked careworn, distressed, and his hair was changed from its natural tint to that of a "light iron-gray color." This to him was a great mystery. In the course of the following day the stupid trick was explained, but the ill-effects of it lasted for a long period. Nearly twenty years after, although his health was fair, the mental powers retained signs of the severe shock they had received; his hair was perfectly gray, and it was but too clear that he would carry the marks of this folly to his grave.

I know of a captain of a vessel, under forty years of age, who suffered shipwreck twice. On the first occasion (in which he lost all hope) his hair quickly turned gray; and on the second, some considerable time afterwards, his hair became still further blanched. He resolved never to go to sea again, and kept his resolution.

Bichat, opposing the scepticism of Haller, asserted that he had known at least five or six examples in which the hair lost its

color in less than a week: and that one of his acquaintances became almost entirely blanched in a single night, on receiving some distressing news. There is no reason to call in question the statement that Marie Antoinette's hair rapidly turned gray in her agony. We have it on the authority of Montesquieu himself that his own hair became gray during the night, in consequence of receiving news of his son which greatly distressed him. Dr. Laudois, of Griefswalde, reported not long ago a case in *Virchow's Archives*, in which the hair turned rapidly white. But I have not any particulars at hand beyond the fact that on carefully examining the hair, he found that there was "an accumulation of air-globules in the fibrous substance of the hair." Sir Erasmus Wilson read a paper at the Royal Society in 1867, on a case of much interest, a *résumé* of which I subjoin in a note.¹

M. Pouchet, who has collected a number of instances of hair-blanching, writes: "The careful experiments made by an eminent physiologist, M. Brown-Séquard, upon himself, leave no room for doubt that a few hours suffice for the hair to be filled with minute globules of air and to become snow-white. Dr. Cassan has reported the history of a lady named Leclère, who was brought before the Chamber of Peers to give evidence in the trial of Louvel, and who underwent in consequence so serious a perturba-

¹ Every hair of the head was colored alternately brown and white from end to end. The white segments were about half the length of the brown, the two together measuring about one-third of a line. Sir Erasmus Wilson suggested the possibility of the brown portion representing the day growth of the hair, and the white portion the night growth, and this opinion was corroborated by the remarks of Dr. Sharpey and others of the Fellows who took part in the discussion. Under the microscope the colors of the hair were reversed, the brown became light and transparent, the white opaque and dark; and it was further obvious that the opacity of the white portion was due to a vast accumulation of *air-globules*, packed closely together in the fibrous structure of the hair, as well as in the medulla. There was no absence of pigment, but the accumulation of air-globules veiled the normal color and structure. Sir E. Wilson observed that as the alteration in structure, which gave rise to the altered color, evidently arose in a very short period, *probably less than a day*, the occurrence of a similar change throughout the entire length of the shaft would explain those remarkable instances of which so many are on record, of sudden blanching of the hair; and he ventured to suggest that during the prevalence of a violent nervous shock the normal fluids of the hair might be drawn inwards towards the body, in unison with the generally contracted and collapsed state of the surface, and that the vacuities left by this process of exhaustion might be suddenly filled with atmospheric air (xlvii., April 20, 1867). Perhaps it would be more easily explained by supposing an arrest of the supply of the nutrient fluids, preceding the entrance of air-globules.

tion that in the course of one night her hair turned completely white. We have the still more decisive and interesting observation of Staff-surgeon Parry in India. It refers to a rebel sepoy, caught by the English troops in 1858, who was about to be shot. All at once a soldier perceived that the hair of the captive was becoming gray, and called the attention of the surgeon to it; the latter was able to observe the progress of the discoloration, which became complete during the time (about half an hour) he was being interrogated. . . . The Dutch physician Junius reports that a Spanish gentleman surprised in a convent and condemned, by Ferdinand the Catholic, to be beheaded, had his hair blanched in the night which followed his condemnation. The King of Castile would, in pity, have even remitted the capital punishment in consequence. A similar event happened to Ludovic Sforza the day he fell into the hands of Louis XII.; and to the Seigneur de Saint-Vallier the father of Diane de Poitiers; but it was not to his gray hairs that he owed his life. Henri IV. used to relate that when on Saint Bartholomew's day he rested twenty four hours after his fatigue, his head reposing on his hands, his beard and hair became white from the chin to the temples where his hands had been. It is said that the Sieur d' Andelot, compromised in the affair of the Counts Egmont and Horn, and punished by his brother Peter, remained many hours with his head resting on his hands; and with him also, when he rose, a part of his beard and of his eyebrow on the same side, had become blanched. The most touching of all such histories is that of Guarini, the professor of Greek at Verona, one of the purest spirits of the *renaissance*. According to Virunio, the hair of Guarini turned suddenly white on receiving intelligence of the loss at sea of a box of manuscripts which he had himself gone in search of at Constantinople. Is not all the *renaissance* figured in this little circumstance? Greek manuscripts lost! That was more than a domestic bereavement, more than a public calamity, it was a catastrophe for all the world!" (*Revue des deux Mondes*, 1872, p. 79.)

M. Pouchet illustrates the fact that nervous influences thus affect the pigment, by the effect produced on animals by section of nerves, and the consequent absence of color in the area supplied by the nerve-force. Thus if a turbot displaying the black spots, be so treated and be thrown into an aquarium with a sandy

bottom, the whole body becomes pale, except the region which no longer receives the cerebral influence. The nerves are very simple and accompany the arteries. If two or three of these nerves about the middle of the body of the turbot are divided, it has the effect of marking on the skin a black transverse band in the course of these nerves; if the nerve supplying the face is cut, the turbot, which is becoming pale upon the sand, presents a black mask having the most singular effect. The turbot, it must be remembered, living in the sand, presents a gray color which can hardly be distinguished from it, but if anything approaches it, large black spots immediately appear. This is also illustrated in Lister's researches on the pigment cells in the skin of the frog.¹

The falling off of the hair is too frequent a result of anxiety or other depressing emotion to escape common observation. A case reported in the *Lancet* of May 4, 1867, forms an excellent illustration:

A man of nervous temperament began business as a draper in 1859. At that time he was 27 years of age, in good health, though not very robust, unmarried, and had the usual quantity of (dark) hair, whiskers and beard. For two years he was in a state of *perpetual worry and anxiety of mind*, and his diet was very irregular. Then his hair began to come off. He declares that it literally fell off, so that when he raised his head from his pillow in the morning, the hair left on the pillow formed a kind of cast of that part of his head which rested on it. In a month's time *he had not a single visible hair on any part of his body*—no eyebrows, no eyelashes; even the short hairs of his arms and legs had gone; but on the scalp there could be seen, in a good light, patches of very fine short down. This was in 1861. Medical treatment proved of no avail, and he was finally advised to do nothing. So long as his anxiety continued, the hair refused to grow, but by the latter part of 1865, his business became established, and, coincidentally, his hair reappeared, and when Mr. Churton, of Erith, reported the case, he had a moderately good quantity of hair on the head, very slight whiskers, rather better eyebrows, and the eyelashes pretty good.

¹ Sir Robert Heron, Bart., states: "A black Poland cock belonging to my neighbor, Mr. Kendall, of Barnsley, was attacked last winter, near the house, by a fox, but his screams being heard by the servants, he was rescued, desperately wounded, with the loss of half his feathers; in time the remainder of his feathers came off, and he has now become perfectly white." (*Proc. Zool. Soc.*, 1835.)

The influence of painful emotions in causing gray or white hair, and alopecia, has been sufficiently illustrated, and it would have been interesting to adduce a reverse series showing the opposite effects of Joy. But it is a very different thing to restore to its healthy habit, the function of a tissue whose pigment has been removed by slow malnutrition, or by sudden shock. If we credit, however, the following circumstance, described to me by the same medical man who attended Thomas W— (p. 316), it shows that hair which has turned gray in the natural course of life, may, by the stimulus of specially favorable events, become dark and plentiful again.

An old man (æt. 75), a thorough out-and-out Radical—even the cancelli of his bones were so impregnated with a thorough disgust of the Government of George the Fourth, that he threw up a lucrative situation in one of the Royal Yards, and compelled his youngest son to follow his example—insisted that his wife, also aged (about 70), toothless for years, and her hair as white as the snow on Mont Blanc, should accompany them to the land where God's creatures were permitted to inhale the pure and invigorating atmosphere of freedom. About six or seven years after their departure, a friend living in New York gave an excellent account of their proceedings. Not only could the old man puff away in glorious style, and the son do well as a portrait painter, but old Mrs. — had cut a new set of teeth, and *her poll was covered with a full crop of dark-brown hair!*

Doubtless the apparently new set of teeth must be explained by the exposure of stumps in consequence of the shrinking of the gums. At least we trust no sceptical reader will suggest an artificial set, or, if he does, that he will not proceed further and challenge the growth of hair by hinting at a wig. It would be a pity to spoil a good story, introduced here with the considerate intention of enlivening an otherwise dry record of facts.

TEETH.—In reference to the nutrition of the teeth, I must content myself with a single example of the effect produced by unfavorable emotional influences. "I have recently known," says Marshall Hall, "the teeth to decay in an extraordinary manner in a few weeks, as the effect of painful emotion, more allied to Fear than any other" (xvii. p. 40). Of course, such a statement without a knowledge of accompanying circumstances which might tend to the same result, must be taken for what it is worth, but I have no reason to doubt the alleged effect.

CHAPTER XI.

INFLUENCE OF THE EMOTIONS UPON THE ORGANIC FUNCTIONS (continued).

PASSING on to the influence of the emotions on *Secretion*, we commence with the sudoriferous glands.

SWEAT.—The ordinary action of mental excitement in accelerating the cutaneous circulation and secretion is familiar enough. The state of the system may be aroused by painful, no less than by pleasurable emotion. For example: when Warren Hastings was thrown into a passion by his recall home, we are told that "the sweat ran down his face" in an extraordinary manner. Of interest in connection with an experiment of Cl. Bernard, in 1851, which showed that division of the cervical branch of the sympathetic in the horse caused increased perspiration on the corresponding side, is the record by Gratiolet of a case in which emotional excitement had the effect of causing the perspiration of the head to be afterwards limited to one side. The sweats of terror are cold. The vaso-motor nerves are so influenced as to cause the capillaries to contract, the temperature is lowered, and insensible is converted into sensible transpiration. If the amount is actually increased, there is probably an escape of fluid rather than augmented secretion. Checking of secretion is seen in emotional anasarca. Many medical authorities have referred to the fact of anasarca following violent emotion of a painful character (innervation lowered). Bateman witnessed the extraordinary influence of alarm upon a poor woman; a sudden universal anasarca following, in one night, the shock occasioned by the loss of a small sum of money, which was all she possessed (*On Cutaneous Diseases*, p. 150). Copland classes such cases under "primary asthenic anasarca;" the vital tone of the small vessels being lowered, the excretory function of the skin is suspended, and serous effusion from the bloodvessels follows. Why, in some,

this serous effusion remains in the cellular tissue, and in others is poured forth through the ducts, it is difficult to say. Possibly spasm of the ducts may have something to do with it. In the following instance, related to me by Mr. Cocks, a very large amount passed away through the ducts; and it becomes a question whether Fear in this case did not act simply in exciting the sudoriferous glands to excessive action. The man's fear was of an anxious, fidgety kind, which was more likely to arouse than to check the function of the glands. Such a case is full of interest and instruction.

John Ford, an officer in the Royal Navy, in George III.'s time, was invalided home from the West Indies for dropsy. Twelve months afterwards he was discharged from the Naval Hospital as incurable, from which date to the time when first seen by my friend, he was under the paternal medical care of a host of ichneumons, who fed on the exchequer of his profits *secundum artem*. As to the disease, it was a matter of no moment—the longer he lived to swallow their trash, the better for them. "They looked on and grinned, grinned and looked on again." Mr. Cocks says he found him propped up in bed, at an angle of sixty degrees, with an anxious and cadaverous countenance. The room was neatly and profusely embellished, not with pictures, but with empty physic phials, pill boxes, and gallipots. He had been well drugged; his system was saturated with nearly nine-tenths of the articles mentioned in the *Materia Medica*. My friend advised him to throw physic to the dogs, for the present, and to submit to the only remedy (in his case) to save life, a *surgical operation*, and that as speedily as possible. This roused him from his lethargy; it was like a powerful electric shock. Alarmed, he shook like a poor wretch under the influence of the cold stage of ague. In a subdued voice, he said (as his excitement partially subsided), "I never can submit to an operation; I would rather die!" "If that be your determination," it was replied, "your case may be considered hopeless; all the drugs in the world will not save you. At all events, I will visit you to-morrow morning to know your decision." Accordingly Mr. C. called on him, but the scene was changed. Soon after his departure, he appeared to be greatly distressed both in mind and body; groaned aloud, wept much, and was very restless. The word "operation" had worked wonders—in fact, a miracle. A

copious *perspiration* was produced, and the steam like that from boiling water, issued from every pore in the skin. The nurse said that more than two gallons of fluid had passed from him during the night. The bedding, consisting of feather-bed, mattress, blankets, and sacking, was saturated through and through with serum, and the floor was flooded with it. The patient recovered, and was appointed to a ship in commission going to Jamaica. Two years after, he died from the effects produced by yellow fever, was buried in one of the "*Campos santos*," and was no doubt eaten by the land crabs in less than a week.

During the "sweating sickness" in the sixteenth century, Fear, as might be expected, frequently induced excessive action of the skin without the development of all the graver symptoms. "Many an one sweats for fear and thinks he has the English sweat, and when he afterwards hath slept it off acknowledges that it was all nonsense" (Bayer von Elbogen, lxix. p. 259).

Sometimes, however, on the mere mention of the subject "amidst a circle of friends, first one and then another was seized with a tormenting anguish, their blood curdled, and certain of their destruction they quietly slunk away home, and there actually became a prey to death" (loc. cit.).¹

Sir H. Holland records the case of a gentleman, æt. 36, and of good health, except that, "on the slightest exertion of speaking, eating, or emotion of mind, sweat broke out profusely in drops from the right side of the face, strictly defined by the median line, the other side remaining in its natural state. The complaint had existed four or five years, coming on without obvious cause" (xvi. p. 178). This unilateral condition is, when excited by such an essentially central disturbance as an emotion of especial interest, but it is difficult not to suppose that in all such cases there is interference with the normal conductivity of the nerve-fibres.

Some emotions affect the cutaneous secretions, not only in regard to amount, but odor. In this and the vitiated intestinal secretions which occur when Fear acts powerfully upon the system, it is reasonable to connect what in man appears to be a useless, and indeed highly inconvenient result, with the analogous occurrence in animals in which flight from the pursuit of the enemy is often secured.

¹ " . . . animos omnium terrore percudit adeo ut multis metus et imaginatio morbum conciliarit " (Erasmus).

URINE.—The curious influence upon the renal secretion (or upon the power to retain it) of a sound which grates upon the mental ear of the listener, referred to by Shakespeare in the well-known passage in reference to the bagpipe is, we presume, exceptional.

The action of mental anxiety or suspense (not fright) in causing a copious discharge of pale fluid is familiar enough to all, especially to the medical student about to present himself for examination, the amount being in a pretty direct ratio to his fear of being plucked. The frequency of micturition may, however, arise from nervous irritability of the bladder without increased, or even with diminished secretion. Still, the action of the skin is usually checked, the extremities are cold, and the kidneys have to pump off the extra amount of fluid retained in the circulation. Müller calls it an example of "suppression of the urine," and though this seems paradoxical, there is in fact a non-elimination of the substances usually separated from the blood compared, at least, with the aqueous character of the whole excretion. Of complete emotional suppression of urine, I do not know an instance. The odor may be affected by the emotions, in man as in animals.

The alleged changes in the chemical composition of this secretion, the result of mental disturbance, are of much interest, but the sources of fallacy in their investigation are great, and may lead to very erroneous conclusions. Dr. Prout, in his *Stomach and Renal Diseases*, states that the depressing passions, particularly Anxiety or Fear, will in many predisposed individuals cause a deposition of the triple phosphates in the urine. In adducing proof that the functional activity of the nervous tissues causes its disintegration by the agency of oxygen (in the blood), Dr. Carpenter refers to the increase of alkaline phosphates in the urine after much wear of mind, whether emotional or intellectual, and alludes to "more than one case of this kind occurring among young men, whose anxiety for distinction had induced them to go through an excessive amount of intellectual labor during their student life, and who found themselves forced to pay the penalty of that excess in a subsequent prolonged abstinence from all mental occupation involving the slightest degree of effort" (viii. p. 352). It is impossible to say in such cases how much of the cause is emotional and how much purely intellectual. With regard to observations on the state of the urine in the insane,

which have from time to time been made, they are somewhat contradictory, and there is the difficulty of determining the priority of the mental and physical phenomena. So far the work done in this field is of an imperfect nature. It may be stated that during a maniacal paroxysm the urine is very acid, scanty, and of higher specific gravity. The late Dr. Sutherland found a plus quantity of phosphates in acute maniacal paroxysms; denoting increased expenditure of nervous force, not inflammatory action. Also, a minus quantity in the stage of exhaustion of mania, in acute dementia, and in the third stage of general paralysis. Drs. Sutherland and Rigby regarded these results as in harmony with analyses of the brain and the blood; a plus quantity of phosphorus being found in the brain, and a slight excess of albumen in the blood of maniacal patients, and minus quantities of these substances in the brain of idiots, and a minus quantity of albumen in the blood of general paralysis. These results have, however, been called in question, and we are disposed to regard some of them as still *sub judice*.

The influence of certain mental states, if prolonged, in causing diabetes appears to be proved. Watson specifies "distress and anxiety," and Copland "great mental exertion and the depressing passions." Claude Bernard's experiments on the vaso-motor nerves and the centres which control them, in explaining the pathological symptoms which arise from the changes induced in the nervous system by definite surgical lesions, show, also, how the emotions may produce the same results.

In Hebrew and Greek the kidneys are frequently employed in a metaphoric sense: "I was pricked in my reins," "my reins shall rejoice," "I try the reins," are a few of the many illustrations which may be cited from the authorized version of the Old Testament. In the New, the same metaphor is once made use of, "I am he that searcheth the reins," *νεφροι*. Parkhurst observes *in loco*: "as experience shows that the workings of the mind, particularly the passions of joy and fear, have a very remarkable effect upon the reins or kidneys, so from their retired situation in the body, and their being hidden in fat, *νεφροι* is used in the New Testament for the most secret thoughts and affections of the soul." The latter suggestion is, I think, rather a doubtful one; however, whether correct or not, there remains the use of the word derived, manifestly, from the influence of the emotions,

including the Imagination, upon the renal secretion, and perhaps the lumbar region. It is rather remarkable that our language supplies no corresponding metaphoric term.

SALIVA.—We have spoken of the influence of simple ideas upon the secretion of saliva under "Intellect," and will now refer to the alleged influence of Anger on the quality of this secretion.

It is interesting to observe that Bichat entertained no doubt that Anger and Love do inoculate the saliva with something "qui rend dangereuse la morsure des animaux agités par ces passions, lesquelles distillent vraiment dans les fluides un funeste poison, comme l'indique l'expression commune" (li. p. 43). The saliva of an enraged animal and the venom of a viper are, according to Eberle, essentially the same.

In the *Lancet* for July 14, 1860, is the report of a case of a boy, æt. 9½, who was bitten by a boy in anger. There was no evidence of rabies, but the boy died. He was seized with hydrophobia forty-eight days after the bite, and died in twenty-four hours. Trousseau quotes from Van Swieten the case of a young man who died of rabies after having bitten his own finger in a fit of anger. Also that of an old woman who died with all the symptoms of rabies after she had received a wound from a cock in a passion. He observes that Van Swieten could not admit that a virus, which was not present in an animal, could by it be communicated, and, therefore, conjectured that the cock had been bitten by a mad fox. This seems rather far-fetched; but it is difficult to understand why anger does not more frequently affect the saliva, and poison those who are bitten by angry persons or animals. Of these cases, however, and in one cited by the same author from Malpighi, who asserts that his own mother died of hydrophobia a few days after being bitten by an angry epileptic, the true interpretation may be, not only that the character of the secretion was altered, but that those who were bitten were in a peculiar condition of health at the time.

In view, also, of recent researches it appears possible that some of these cases may be due to the poisonous effects of a ptomaine already in the saliva.

Gaubius records several cases. A soldier quarrelled with a woman, who thereupon bit his hand. He was seized with rigors and died. An enraged Italian youth, unable to revenge himself,

bit his own hand and was seized with a deadly fear of water, as if bitten by a rabid dog.

Gaubius confessed himself unable to explain how "such pestilent corruptions of the fluids are so suddenly excited." In reference to this observation, Prochaska admits that it is quite possible that the nerves, irritated by anger, may by virtue of their influence over the secretions render them impure, although we cannot determine in what this impurity consists (i. p. 421). While Anger increases and poisons this secretion, Fear checks or suspends it, as is indicated by the parched mouth, which is readily explained physiologically by the inhibition of the nerve-endings of chorda tympani in the salivary glands.

Speaking of the salts of the saliva, Mr. Wilkinson (xlix.) forcibly says, "they become as different at different times and in different persons, as the billing of the dove from the bite of the rattlesnake, or the sweetest milk from deadliest poison. There is saliva full of care and sourness, which eats, not the food, but the stomach itself. There is saliva charged with contempt, which is spit upon meanness, and carries the badge from soul to soul where it lights. There is the saliva of disgust, which is vomited from the loathing blood, and avenges our disgust upon the ground. There is the spittle of self-complacency, elicited by the happy tongue, and too good not to be swallowed. There is the saliva of rage, which foams violently forth upon the beard, and that of haste and hurry which froths and sputters. There is the saliva of grief, hard to get down, and full of choking. There is the mouth of fear, from which the saliva is frightened, and the dry tongue cleaves to the palate."

GASTRIC JUICE.—Pleasurable emotions increase the amount of gastric juice secreted, the opposite effects being produced by depressing passions. Dr. Beaumont found in the man with the fistulous opening into the stomach "that anger or other severe mental emotions would sometimes cause its inner or mucous coat to become morbidly red, dry, and irritable; occasioning at the same time a temporary fit of indigestion" (xliii. p. 22). In dyspepsia, which constitutes so forcible an illustration of the influence of abnormal mental conditions, a change in the character or amount of this secretion, may or may not be the principal cause, but that morbid feelings acting directly on the stomach through the pneumogastric and sympathetic nerves, do form one important

element in the psychical genesis of the dismal symptoms comprised under this term, cannot admit of doubt.

Claude Bernard, in his lectures, in 1860, showed that taking the two nerves of which the solar plexus is composed—the vagi and the sympathetic—as those which influence the digestive process, galvanism of the vagi excited secretion of the gastric juice, while the same stimulus applied to the sympathetic arrested it. “We therefore meet with two orders of nerves in the stomach as in the case of all other glands: motor nerves which accelerate the secreting process, and organic nerves which oppose it. In accordance with the above, Dr. Rutherford, Professor of Physiology in the Edinburgh University, found that division of the vagi during digestion caused blanching of the mucous membrane of the stomach” (xxxii., May 20, 1870). We have every reason to suppose that the emotions act powerfully upon the digestive process through the nerves composing the solar plexus; the depressing emotions contracting, and the exciting emotions dilating the capillaries of the stomach. Whether a depressing or painful emotion, Fear, for example, contracts the vessels by stimulating the sympathetic nerves or by paralyzing the vagi, may be doubtful, but the probability would seem to be that it suspends the action of the latter and allows the former full sway. (See Summary at the close of this chapter, and also the remarks on the action of the vagus on the heart in connection with the emotions.)

Fletcher in his “Sketches” mentions a barrister who enjoyed perfect health, except when anxious during the assizes. Then the tongue became brown, the appetite vanished, and if food was taken, severe pain in the stomach succeeded. His anxiety once removed, his tongue cleans, and “his appetite, a distinguished one, returns with such uncontrollable force, that this limb of the Law stops at a half-way house in his return home, when the limb of an animal less dangerous than himself satisfies, in some measure, the capricious humor of his otherwise most respectable and certainly very capacious stomach” (lxxiv. p. 19).

Brierre de Boismont records the case of a convict who was greatly surprised and distressed with the verdict he received. Gastric and hepatic symptoms followed, and it was thought he would die. He was removed from the prison. He scarcely took any nourishment, and suffered from continual nausea, and frequent vomiting, the matter thrown up being chiefly mucus.

Organic lesion of the stomach and hepatic tumor were diagnosed. In a week, however, he improved; he was able to take a few spoonfuls of soup, and he eventually recovered. He said (and his doctor agreed with him); "Si j'étais resté huit jours de plus dans la prison, j'étais un homme mort" (xxxv., 1853).

Bichat maintains that cancer of the stomach frequently owes its origin to powerful emotions: "l'impression vive ressentie au pyllore dans les fortes émotions, l'empreinte ineffaçable qu'il en conserve quelquefois" (li. p. 40).

LIVER.—Popular opinion connects bile and bad temper or melancholy together, perhaps more thoroughly than any other psychical and physical facts, the supposed order of events being sometimes psycho-physical, and at others physico-psychical. This latter is implied when we say that a man displays a great deal of bile, and from the same cause originates the word choleric. Homer speaks of the *χολος* of Achilles in the *Iliad* (ii. 241).

"Achilles bears no gall within his breast."

And it may be noted, as marking the interchangeableness of bodily and mental terms, that it is as fitting to speak of "the gall of bitterness" as the bitterness of gall.

The Latin poets abound with references to the connection between the liver and the emotions, as in Juvenal:

"Quid referam quantâ siccum jecur ardeat ira?"

But such passages bear more especially upon the supposed seat of Anger in this organ—an idea mainly springing, however, from the influence of the mental states upon the viscera. It was not Anger alone which was supposed to be connected with the liver. The "jecur ulcerosum" of Horace was induced by Love. Plautus terms this feeling "morbus hepaticus;" Solomon speaks of the misguided youth in whom "the dart" of passion "strikes through his liver." It is to Grief that Jeremiah alludes when he complains, "my liver is poured upon the earth."

Gaubius, in asserting that the natural properties of the juices may be so altered that, with astonishing rapidity, the bland becomes acrid, and the salubrious hurtful—nay, virulent—asks, "Do you doubt it? I give you the example of an hysterical woman who, in a passion, vomits vitiated bile of every color and acridity." Dr. Carpenter remarks that it is "perhaps not an ill-

founded opinion that melancholy and jealousy have a tendency to increase the quantity, and to vitiate the quality of the biliary fluid," and that "it is certain the indulgence of these feelings produces a decidedly morbid effect by disordering the digestive process, and thus reacts upon the nervous system by impairing its healthy nutrition" (viii. p. 982). The influence of sudden fright in checking the secretion of bile, and so occasioning jaundice, is adduced by Bichat as a striking proof of the connection between mental states and the secreting organs. Emotional jaundice, like emotional cholera, may, as already stated on p. 301, be also caused by abnormal action of the muscular coat of the gall-duct and the intestines, and it would be hard to decide, in a given case, to which division to refer the symptoms. Dr. Budd, in his *Diseases of the Liver*, observes that jaundice, following mental shock, long-continued anxiety, or grief, is often unattended by any alarming symptom, "but, now and then, after it has excited for some time without any symptoms indicative of especial danger, disorder of the brain, which proves rapidly fatal, comes on. After death in such cases portions of the liver are sometimes found completely disorganized. *It would seem that some virulent poison is generated in the liver*, which deranges and then paralyzes the brain, and after death come softening and disorganization of the liver itself" (p. 478). Dr. Wilson Philip asserts that depression of mind, if protracted, alters the structure of the liver. Dr. Badeley records the case of a certain great military officer who left England at an advanced age, to take possession of his office, without his lady, and without even bidding her farewell. As soon as she heard of his departure, she almost immediately became yellow, took to her bed, refused all food and medicine, and died in a very few weeks (xc.). Dr. Anthony Todd Thompson states that "a young man in Paris had a musket pointed at his breast; he became suddenly deeply jaundiced, for which he was taken to a hospital and died."

Dr. Murchison, in his Croonian Lectures on the *Functional Derangements of the Liver*, observes that "there is good evidence that nervous agencies may not only cause functional derangement, but cure structural disease of the liver. Acute atrophy in which the secreting cells are rapidly disintegrated and the functions of the organ arrested, appears in many instances to have a purely nervous origin; very often the first symptoms of the disease have

occurred immediately after a severe fright, or an outburst of passion in a person previously healthy. . . . Many observations have satisfied me that the extrusion of gall-stones from the gall-bladder as well as their formation may be traced to nervous agency. . . . I have repeatedly known attacks of biliary colic from gall-stones excited by some sudden emotion. Lastly, even cancer of the liver appears sometimes to result from the functional derangement induced in the first instance by mental trouble. I have been surprised at the frequency with which patients suffering from primary cancer of the liver have traced the commencement of their ill-health to indigestion, following protracted grief or anxiety. The cases have been far too numerous to be accounted for on the supposition that the mental distress and the cancer have been mere coincidences. A similar observation has, I believe, been made by Sir Robert Christison and by other eminent authorities" (xlvii., May 2, 1874).

Passing from the liver we may here refer to the *spleen*, which in our language is so frequently employed metaphorically. A fretful person is splenetic, spleenful, or spleeny (Shakespeare); a mild and gentle person, spleenless. In a curious old book, the *Breviary of Health*, published in 1552, by Andrew Borde, the writer, after observing that "melancholy meats, hard chese, and feare is not good for the spleen," adds, "in English it is named the passion of the splene. The cause of this impediment: This impediment doth come by thought, anger, or care, or sorrowe, of imprysonment, of feare and dreade, and for lack of meat and drynke. And it may come of great solytudnes, or solytudnesse to study, or to be occupied about many matters. A remedy: The chieffest remedy for this matter is to use honest and mery company, and to be iocunde and nat to muse upon no matter, but to leaue of al pleasure and nat to study upon any supernaturall thynges, specially those thynges that reason can not comprehend, nor use not to lean or stoupe downe to write or ride, and beware of slepe the afternone and use the medicines the which he expressed in the chapitre named Splen" (Antiquarian Notes, in the *Athenæum*, September 16, 1871).

I regret that I have no more positive evidence of the influence of the emotions on this viscus, though it seems highly probable that it is very considerable in such an organ as the spleen.

INTESTINAL SECRETIONS.—Apart from muscular action, defecation may become urgent, or occur involuntarily from various causes, one being the increased secretion from the intestinal canal, as from Fear, and in some cases from the altered character of the secretion itself. While in this respect the influence of Fear may be inconvenient in man, it naturally assists escape in some animals, as the polecat.

Certain cases of choleraic diarrhœa (although, of course, complicated with other pathological states) may be referred to here.

The story of the Russian convicts under sentence of death, some of whom were placed in beds falsely said to have been occupied by cholera patients, will occur to the reader. Mr. G. Smith reported in the *Lancet* of August 4, 1866, the case of a fine, hale blacksmith under surgical treatment in King's College Hospital, who carried down the bed on which a cholera patient had died. He sat up until late, brooding over what he had done and its probable consequences. He died next morning of cholera. Those, however, who believe that cholera is contagious would not admit that, in this case, Fear was more than the exciting cause of the attack.

When, some years ago, the cholera was prevalent at Newlyn, a fishing village near Penzance, intercourse was forbidden between the two places. One day a man entered the shop of a barber in Penzance, and was shaved. On leaving, some one, who had recognized him, asked the barber if he knew whom he had been shaving. He replied he did not. "Why, he's a man from Newlyn!" It was enough. The terrified barber was seized with cholera, and died within twenty-four hours.

Mr. —, of Falmouth, some years ago, had the cholera. When well, he went to the Lizard for change. The woman who opened the door of the house to which he went, having heard that he had had the cholera, was exceedingly alarmed, and had an attack herself.

CATAMENIA.—It would be tedious to enumerate even a small proportion of the cases which are on record, showing the influence of moral causes on the suppression of this secretion. Disappointed affections, every one knows, are a fruitful cause, and in such instances there can be no confusion between cause and effect. The sequence of the phenomena is also clear when Rage operates, as in a case recorded by Brierre de Boismont, of a lady

who was thrown into a furious passion by some circumstance, in consequence of which suppression took place. Remedies failed to relieve her, and she became insane. Regarded as possessed, she was exorcised, but without effect. Subsequently, medical treatment restored the uterine functions, and, concurrently, her mental health (xxxv., 1851, p. 593).

MILK.—The influence of emotional excitement on the secretion of the mammary gland is generally recognized, and there is no difficulty in meeting with cases which forcibly illustrate it. A few striking examples must suffice.

Descuret states that during a period of four years, a young woman suddenly lost her two children and a foster-child from giving them the breast immediately after being in a violent passion (lxvi. p. 56). He also cites from Parmentier and Deyeux, that after powerful emotional excitement, the mammary gland secretes an insipid yellowish serous fluid, instead of one possessing its normal white saccharine character. Copland cites from Gräfe, the very striking case of a woman who received a fright a week after delivery. This caused complete suppression of the milk, followed by ascites and anasarca. Paracentesis was performed; "a bucket of fluid resembling whey, and exhaling an acidulous odor, was drawn off. Upon being boiled with dilute sulphuric acid, it furnished a substance resembling casein. When tapped six weeks afterwards, the fluid was of a greenish-yellow, and without the least trace of casein" (lxx., i. p. 189).

Dr. Kellogg, of Port Hope, Canada West, gives the following cases:

"Not long since, I was called to see a child aged seven or eight months, which up to a short time before my being sent for, had been in a most thriving condition, exceedingly healthy and robust. I found the child in a state approaching complete coma, in a condition much resembling that which results from hydrocephalus, or anæmia of the brain, as the result of some exhausting disease. It had suffered none such, however, and as the coma had come on suddenly, constipation of the bowels only having been observed as its forerunner, I felt puzzled to determine the true cause. After, however, a free action of the bowels, for which large doses of cathartic medicine were required, it rapidly regained its consciousness, and after passing dark-green stools for a number of days completely recovered. The

mystery which shrouded this case, and which I was not able to unravel at first, was soon however explained, for in conversation with a near neighbor I learned that the mother, who was a woman of very violent temper, had for a number of days, been giving way to most intense paroxysms of rage, which had been expended upon her husband for selling a piece of property against her wishes. During all this time she was nursing her child. I immediately requested the mother, if she wished to rear her offspring, of which she was passionately fond, to suspend nursing it under such a state of mental excitement; and if she could not make up her mind to be quiet and cheerful, it would be advisable to wean the child, or employ a wet-nurse, while giving the reins to her passion, and not allow its force to be expended upon the frail being who was innocently drawing its nourishment from her bosom. She appeared to feel the justice of the reproof, and was, doubtless, more careful for the future, as the child did well, though not weaned for several months after this occurrence (lxxviii., April, 1856, p. 313).

Dr. Kellogg observes, "I am confident that I have frequently seen the death of the nursing infant result from ignorance of the mother of the extraordinary influence of mental emotion upon the secretion of milk."

TEARS.—The secretion of the lachrymal gland is, we know, excited by joy (and tender emotions) as well as by grief, its natural excitant.

" Back, foolish tears, back to your native springs—
Your tributary drops belong to woe,
Which you, mistaking, offer up to joy."

ROMEO AND JULIET, iii. 2.

We must confess with Brodie that we are unable to answer so simple a question as, Why or how does a certain state of mind augment the secretion of this gland? Gratiolet inferred, partly from his own sensations, that tears result from reflex irradiations which traverse the fifth pair of nerves; that is to say, the emotion of Joy or sorrow acts first upon the heart or other viscera through motor channels, and is then reflected upon the sensory nerve supplying the gland. But this track does not seem anatomically or physiologically probable. Much more likely is it that the influence is transmitted directly either to the capillaries of the

gland by actively dilating motor nerves, or through nerves to the lachrymal cells themselves, directly exciting their functional activity.

The *quality* of the secretion seems to be altered by powerful emotions, the saline ingredients being increased, causing "a strong brine."

Lastly, the secretion may be checked. The intensity of the feeling or the suddenness of the sorrow is the most frequently witnessed cause. Daily observation shows that the first result of distressing intelligence is the negative one—inability to cry. See, too, what the want of a handkerchief may do. "I went," says Hunter, "to see Mrs. Siddons acting; I had a full conviction that I should be very much affected, but unfortunately I had not put a handkerchief in my pocket, and the distress I was in for the want of that requisite when one is crying, and a kind of fear I should cry, stopped up every tear, and I was even ashamed I did not, nor could not, cry" (*Posthumous Papers*, vol. i. p. 557).

EXHALATION AND ABSORPTION.—As all dropsies may be referred to increased transudation or diminished absorption, we would briefly refer under this head to two cases illustrative of the influence of emotional excitement in checking and exciting these functions. The influence of the sympathetic nerves upon absorption has been demonstrated by Bernard; their division accelerating, and galvanism suspending the process.

Dr. Py, physician to the hospital at Narbonne, reported in the *Gazette de Santé* the case of a boy, æt. 11, in whom ascites occurred under the following circumstances: Pierre Peyrel, having lost his father, imagined in a dream that he returned and embraced him, which gave him a great fright. He was a pupil at the "Hotel de la Charité," and the officers of the establishment were surprised next morning to find the abdomen distended (*enflé du ventre comme un ballon*), as the lad had played and taken his food as usual the preceding day. He was found by the doctor to be feverish, the pulse small and hard, and the abdomen painful and tender. Medicines having failed to remove the effusion, the surgeon to the hospital drew off ten pints (Paris measure) of clear fluid, the cure being completed by local frictions and diuretics.

In the following case (which was regarded as one of ascites), for the genuineness of which I can vouch, the pathology is doubtful, and therefore it is rather recorded here on account of

its importance than as necessarily a proof of direct absorption. The fluid rapidly disappeared as the action of the kidneys increased :

A woman, aged about 45, was attended by Dr. B—, in a small town in Devonshire. He found medicines perfectly useless, and was, therefore, determined to try his hand (his first essay) at paracentesis. He intimated to the patient what he intended to do on the following morning, which alarmed her much; in fact, nearly frightened her out of her wits. He invited two of his medical friends to assist him in the operation. The trio were duly ushered into the sick-room—but no operation! The fluid had vanished, discharged chiefly by the bladder. They found the poor creature exhausted, blanched, and as thin as a lath. The abdomen was bandaged, and the worthy doctors walked back to the surgery to consult and unriddle the mystery.

A passing reference may here be made to the influence on pulmonary exhalation of emotional states, the breath being rendered notably offensive by distress of mind, and to the acid eructations and flatulence, exhaled from the digestive mucous surfaces, which arise from the same cause. In regard to heartburn, an expression which receives an illustration from Shakespeare, indicates the popular belief. "How tartly that gentleman looks! I never can see him but I am heart-burned an hour after." Though mental heartburn only be implied, the metaphor is itself a recognition of the relationship between the two states—bodily and mental.

Before concluding the consideration of the influence of the emotions upon the organic functions, I wish to refer to several disorders of the system which are important illustrations of this influence, and which may, perhaps, be enumerated here more appropriately than in any other place; they should be studied in connection with the action of the vaso-motor nerves.

FEVER.—According to Cl. Bernard, the early stage of fever marked by rigors is analogous to that which is artificially produced by reflex action upon the sympathetic, and consequent constriction of the vessels, by galvanizing the central termination of a cerebro-spinal nerve, this being followed by elevation of temperature in consequence of the vascular dilatation which succeeds the vaso-motor excitement. The latter febrile state answers also to that caused by section of the sympathetic. "If," says

Bernard, "we only suppose the generalization of the phenomena which we have observed as the result of the division of the ascending branch of the great sympathetic, we should have a true fever—increase of heat, a sense of oppression, rapid pulse, perspiration, brilliancy of the eyes, etc." "We have seen besides that on the side on which the sympathetic has been divided, the blood preserves its bright red color while traversing the capillaries; the phenomena of nutrition do not take place. The same thing occurs in certain pathological states. Thus, since I made known my experiments, cases of malignant fever have been published in which the blood passed on into the veins, having the appearance of arterial blood, venous pulsation being also observed. In these conditions the sympathetic system is in a state similar to that in which section has been performed, a remarkable elevation of the temperature of the surface of the body being also present. But in these conditions there is also an equilibrium between the external phenomena of heat and the internal temperature. The hepatic and intestinal functions, the principal sources of animal heat, are no longer performed. The production of heat ceases in those internal organs whose functions are suspended, but is, on the contrary, very actively produced in superficial parts." M. Bernard adds that the increase in the fibrin of the blood in fever, is paralleled by what he has observed in animals in which the great sympathetic has been divided. The general inference drawn from these facts by this physiologist as to the nature of fever, is very important in its bearing on the influence of the emotions upon its production, this inference being that "fever ought to be regarded *as a phenomenon purely nervous*. We may, in short, produce all the disorders of the organic functions which mark its course *by acting upon the nervous system, and upon it alone*" (lxviii., 1872, p. 347).

Many interesting observations were made by Dr. Rush on the "Bilious Yellow Fever" which raged in Philadelphia in 1783, and among the causes of attacks of this fatal malady he enumerates "a sudden paroxysm of fear." But while he observed this to be the case in many instances, he saw more remarkable examples of nervous or timid people escaping, although constantly exposed to the miasmata. He conjectures that a *moderate* degree of Fear helped to counteract their injurious influence, a healthy equilibrium resulting from the opposition of two stimuli; but

whether this explanation is satisfactory or not, his statement of fact which follows is of much interest. "I am certain," says he, "that Fear did no harm after the disease was formed in those cases where great morbid excess of action had taken place. It was an early discovery of this fact which led me not to conceal from my patients the true name of this fever when I was called to them on the day of their being attacked by it." Indeed, he goes further than this, and says, "Fear coöperated with some of my remedies in reducing the morbid excitement of the arterial system" (lxi., iii. p. 49).

Attendants upon the sick, in this fever, were observed to be themselves materially influenced by the prospect of the patient's recovery. So long as there was hope, they often escaped. But when hope was extinguished, they were frequently attacked by the disease—most of the near relations of the deceased falling victims to it. On the other hand, an opposite state of mind to that of Grief also produced the disease, or rather rendered persons more liable to it. For after nursing a relative who recovered, many became affected in a few days, notwithstanding their joy, in consequence, no doubt, of mental collapse. Their hopes were fulfilled, attention upon an object external to themselves was no longer required, and a general relaxation of the energies followed, only too favorable to the invasion of fever. Dr. Jackson, in his *Treatise on the Fevers of Jamaica*, states that the garrisons of Savannah and Yorktown remained healthy so long as those towns were besieged, while Savannah became affected when the French and American armies retreated from it, and Yorktown when it capitulated (lxi., iii. p. 50). In both instances the mental tone of the inhabitants ceased to be wholesomely maintained; Joy in the former did not prevent the deleterious influence of the reaction, and Grief or Disappointment in the latter produced their natural fruits. So complex are psychical causes, that opposite events will occasion the same results, but when analyzed there is no real inconsistency in their operation, and they fall under well-understood psychological laws. The perception and recognition of these laws by the physician is important in the invasion of disease, especially of epidemics.

In the reports of cases of Continued Fever given by M. Andral, in his *Clinique Médicale*, occurs that of a young man, æt. 22, whose disorder did not originate in Emotion, but whose death appeared

to be hastened by Fear. The patient had been told that the plague reigned in the Paris hospitals. He was very much alarmed by this news (which was false), and he regarded himself doomed to inevitable death. The pulse became frequent after having improved, stupor appeared, and he died three days afterwards. Andral, commenting on this case, says, "When convalescent from a dothinentérite, a moral excitement acted on him; he all at once presented symptoms which indicated considerable disturbance of innervation. He died in a few days, and anatomy discovered neither in the nervous centres nor elsewhere any lesion whatever to account for the alarming phenomena which hurried him to the grave" (p. 782).

INTERMITTENT FEVER.—Nebelius was lecturing one day upon Medicine, the subject being a description of ague; when one of his pupils (doubtless highly susceptible and nervous) became pale, began to shiver, and at last had all the symptoms of intermittent fever. He was laid up, had three or four paroxysms of tertian fever, and was cured by the usual anti-periodic remedies (lx. p. 295).

This is an admirable illustration of a fearful imagination producing the thing feared. And when we extend the examination of psychical disease-producing causes to those which induce disorders not connected with any disease in the person's mind, we find examples of ague induced by sudden fright which are strikingly illustrative of the morbid effects of this emotion. In the *Annales Médico-psychologiques* (1851, p. 660) is reported a case of "Tertian Fever caused and cured by a vivid moral emotion" which falls under this category. A young lady, Mademoiselle Elisabeth, was engaged in needlework at the window when she saw a neighbor precipitate himself from the upper story of his house. She was instantly seized with nervous tremors which nothing served to lessen, and by their persistence for some days occasioned her family great alarm. At last, under the treatment adopted—prolonged baths, anti-spasmodics, etc.—she became calm and was considered cured, when, on the approach of the catamenia, an attack of tertian fever supervened, "*parfaitement caractérisée*." The attacks returned at the same periods in spite of appropriate treatment ("*le plus varié et le mieux indiqué*"). Her physician, Dr. Bouygnès, failed to modify the course of the disorder except in the intermediate time of uterine repose. We

may add that she was cured by a purely psychical agent, the sudden return home of a brother, the captain of a vessel, who had been exposed to great danger in a voyage. Her emotion was so intense that she remained motionless, her eyes fixed upon him, and unable to speak a word. She afterwards said that at that moment she underwent an extraordinary change. The attacks of ague never returned.

The Duke of Norfolk, when suspected by Queen Elizabeth of conspiracy, and anxious to clear himself in her presence, found his heart fail him, and "fell into an ague, and was fain to get him to bed without his dinner" (*Froude's History*, vol. ix. p. 473).

Sir Samuel Baker, in his *Albert Nyanza*, after describing the symptoms of the fever which prevailed and proved frequently fatal in Africa, and was of an intermittent type, observes that "any severe action of the mind, such as Grief or Anger, is almost certain to be succeeded by fever in this country" (vol. i. p. 394), just as full occupation of mind was found to act as a prophylactic against it.

MEASLES.—Lady Springett relates in an Autobiography that, "After the battle of Newbury, my husband (Sir William Springett) gave the messenger he was sending to the Parliament, to acquaint them with the issue of the battle, a piece, only to knock at the door of my lodgings in Blackfriars, and leave word that he saw him well after the battle, there being time for no more; which message in all probability saved my life. I being then sick of the measles, which could not come out because of the exercise of my mind by reason of my having heard of the battle.

"The message was left between 3 and 4 o'clock in the morning, at the hearing of which the oppression was rolled off my spirits, like the removal of a great stone, and the measles came forth" (*Penns and Penningtons*, p. 38).

RHEUMATISM.—I have known two cases in which fright brought on a rheumatic affection of the joints. In one case a woman heard that her husband, who was at work in a town at some distance, had had a severe accident. She was in good health at the time, and after the shock she had received, her wrists and ankles became swollen and painful. Ever since, a period of six years, she has been subject to more or less stiffness of the joints.

In the other case, a boy, aged about sixteen, was alarmed by a drunken man, who one night ran after him with a stick, but did

not succeed in overtaking him. The boy on reaching home was pale, and suffering altogether from nervous shock. Feverish symptoms followed, and several of the joints shortly afterwards became painful and swollen. When recovering from the attack he suffered a relapse from exposure to the air, and was laid up for some weeks. The case is very similar to several reported by Dr. Todd, which ended in chorea.

GOUT.—Among the remote causes of this malady Dr. Rush enumerates "public and domestic vexation, the violent or long-continued exercise of the understanding, imagination, and passions, in study, business or pleasure;" and among the exciting causes, "a sudden paroxysm of joy, anger, or terror" (lxi., ii. p. 149).

Dr. Badely says: "A friend of mine had a fit of gout brought on by fretting, and cured suddenly by the alarm of a house being on fire."

In speaking of the causes of gout, Sydenham, himself a martyr to it, observes that the disease follows the over-application of the mind to serious matters, and deep study.

"Melancholy, so-called, is preëminently the inseparable companion of gout. Hence, those who are liable to it are so wont to tire and overwhelm the animal spirits by long and deep thought, that excessive exertion of this sort, even without the artificial aid of reading makes the proper preservation of the economy of the body an impossibility; for which reason (as seems to me) gout rarely attacks fools. Those who choose may except the present writer" (Works, Syd. Soc., vol. ii. p. 148).

DEATH.—We have already, in the Chapter on the Influence of the Emotions on the Involuntary Muscles, recorded cases of death from indisputable action on the heart or brain. In this place several more may be given without, however, any proof being afforded of the immediate cause of death, with the exception of the following very striking case which has occurred quite recently, and is reported in the *Lancet* (Sept. 1, 1883), by Dr. J. E. Cooney, of London.

"G. E. H.—, aged seven years, the son of a sweep, had been witnessing a fight between two gipsy lads, when, as the contest became exciting, he suddenly fell backwards and was dead in a few moments. I was called in by the police, immediately after death, and found the body, which was still warm, lying on its

dorsal aspect on a soft patch of grass. The features had a placid expression, and his soot-smeared face exhibited the traces of recent tears. It was stated that there was no one nearer to the boy when he fell than the two belligerents, who were about ten yards' distant.

"The history which I elicited was as follows: The father had been a soldier, in India and elsewhere, for twenty-one years prior to taking up his present occupation, which he had followed for the last three months only. The mother had died suddenly a year ago, and was the subject of a coroner's inquest; but the cause of her death I have, in vain, tried to discover. The deceased was an only son. His sister, aged four years, seems delicate, and I learn that his half-brother and sister are robust and healthy, and have no neurotic tendency. He was of a remarkably affectionate disposition, and was easily excited by the slightest unusual occurrences. The boy had had his dinner a quarter of an hour previous to death, and had kissed his father before leaving home as usual.

"Agreeably to the coroner's order, I made an autopsy forty-eight hours after death. The body was plump, and the external aspect on examination showed no marks of injuries or contusions. Head: The dura mater was not adherent to the brain, neither was there any sign of fractures or effusions of fluid. The brain weighed forty-two ounces, was well-formed, firm, and with convolutions and sulci well marked. The puncta vasculosa were a little more than ordinarily prominent. The several ganglia and ventricles of the brain were normal; minute examination betrayed no rupture of bloodvessels or extravasations. The examination of spine showed no dislocation or other injury in the region of the atlas and dentata or elsewhere. The medulla oblongata and cord were apparently healthy. Chest: The right cavity showed a few old pleuritic adhesions; left pleura and cavity healthy. The lungs were normal, though a little gorged with blood; the pulmonary veins contained some fluid blood; the pericardium was healthy, and its secretion was of the normal color, quality, and quantity; the right auricle was much distended, almost to bursting, with dark grumous fluid blood; the right ventricle was about one-third full of the same; the superior and inferior cava and hepatic veins were also much distended with dark fluid blood; the left auricle was full but not so distended as

the right; the left ventricle also contained a little fluid blood. The pulmonary veins were filled with fluid blood, and the two left veins terminated by a common opening in the left auricle. The heart's septum was normal, and its valves competent, and there was no evidence of rupture or disease. The liver was normal and healthy, the hepatic veins being filled. The kidneys were normal. The urinary bladder was half filled, and was perfectly healthy. There was no sign of injury to the abdominal walls. The diaphragm, peritoneum, spleen, pancreas, and suprarenal bodies were perfectly healthy and in their normal positions."

At the inquest, Dr. Cooney expressed his belief that the boy's death was due to strong emotion. His explanation was in accordance with the most probable view as to the way in which a fatal result is brought about in such cases, namely, that the heart's action is inhibited through the action of the vagus under excessive emotion, the cardiac ganglia of the sympathetic being completely antagonized.

The ill-effects of Joy, when excessive, so contrary to its beneficial influence in moderation, has often been a subject of philosophical remark. I have seen it stated, within a few years, that several convicts, Irishmen, undergoing imprisonment for life, fell down dead on being informed that they were liberated.

The following are well-known instances:

Valerius Maximus states that two Roman matrons died with Joy on seeing their sons return in safety from the battle fought near Lake Thrasymentus. "One died while embracing her son; the other was suddenly surprised by the sight of her son while she was deeply lamenting his supposed death."

I may add that quite recently similar fates, the result of a rebound from Grief to Joy, have awaited several women in connection with shipwrecks, their husbands having been reported as certainly lost and then turning up.

That this influence would resolve itself into one of sorrow in some instances may be suggested by the cynic, but we decline for the honor of human nature to accept this explanation.

History also records that "Sophocles, at an advanced age, and in the full possession of his intellectual power, composed a tragedy which was crowned with such success that he died through Joy; that Chilon, of Lacedemon, died from Joy while embracing his son, who had borne away the prize at the Olympic games. Juventius Thalma to whom a triumph was decreed for subjugating

Corsica, fell down dead at the foot of the altar at which he was offering up his thanksgiving. Fouquet, upon receiving the intelligence of Louis XIV. having restored him to liberty, fell down dead" (lxxvi. p. 96). To these examples may be added those of Diagorus, an athlete of Rhodes, who died from seeing his three sons return crowned from the Olympic games; and Dionysius, the second tyrant of that name who died on hearing the award of a poetical prize to his own tragedy (xliii. p. 18.)

SUMMARY.—1. The emotions powerfully excite, modify, or altogether suspend the organic functions.

2. This influence is, in all probability, transmitted not only through vaso-motor nerves, but through other nerves also, namely, those in close relation to Nutrition and Secretion (*e. g.*, chorda tympani, etc.). As, when the excitement is of peripheral origin, a sensory or afferent nerve excites their function by reflex action, so when Emotion arises it may excite the central nuclei of such afferent nerve, and this stimulus be reflected upon the efferent nerve; or it may act directly through the latter.

3. In regard to the processes of Nutrition, the pleasurable emotions tend to excite them. Hence the excitement of certain feelings may, if definitely directed, restore healthy action to an affected part.

4. Violent emotions may modify Nutrition. Various forms of disease originating in perverted, defective, or inflammatory nutrition are caused primarily by emotional disturbance.

5. As respects Secretion, the emotions, by causing a larger amount of blood to be transmitted to a gland, increase sensibility and warmth, and so stimulate its function, or they may directly excite the process by their influence on nerves supplying the glands.

6. Painful emotions may modify the quality (*i. e.*, the relative proportion of the constituents) of the secretions.

7. The emotions may check Secretion, either by extreme acceleration of blood through a gland, by unduly lessening its afflux, or by direct influence upon the gland. Although, as a rule, the activity of those glands which bear special relation to an emotion, is in a direct ratio to its force, the secretion is checked when the emotion is excessive.

8. The pleasurable emotions tend to act only in one direction, that of increased activity of the secretions, but the painful emotions act both in stimulating and arresting Secretion. Thus, Grief excites the lachrymal, and Rage the salivary glands. Ex-

cess of Grief checks the lachrymal, and Fear the salivary glands, while Anxiety suspends the gastric. *Extreme* Fear induces perspiration.

9. Lastly, although it may be doubted whether we are yet able to construct a consistent theory of the action of the emotions upon Secretion, we may endeavor to apply what we do know to occur on the external surface of the body to the internal organs, supplemented by the conclusions arrived at by Bernard. Fear, then, causes pallor of the cheek (apart from its action on the heart). Either the contractors of the minute vessels have been stimulated, or the active dilators have been paralyzed. Assuming that the capillaries of the glands are similarly affected by Fear, we should infer that there would, with this emotion, be less vascularity and secretion. Consistently with this, we find the secretion of milk lessened by Fear or Fright. The temperature of the skin is lowered, and its secretion checked, although cold sweats, as already explained, may occur. Salivary secretion is arrested. Intestinal secretion is often increased, it is true, but probably this may be explained, so as not to form a real exception to the general rule, that Fear has the effect on secretion which we should have expected from facial pallor. In the opposite condition of the cheek, from shame or guilt, it is difficult to say whether the activity of the glands tends to increase or decrease, but probably the former, and if so, the parallel holds good. If, further, we regard the influence of Joy, when taking the place of Fear, it restores vascularity to the cheek, we see that the general action of joyful emotions is to augment the activity of the glands. The special action of Grief in exciting the lachrymal secretion cannot fairly be regarded as an exception; and Joy, even in this instance, may exercise its normal influence. In this condition of the cheek and glands we assume that either the vaso-motor contractors have been paralyzed, or the active dilators have been stimulated—probably the latter. We have here confined ourselves to the action of the vessels, but by no means exclude the action of nerves which may act directly upon the glands. With regard to these, we cannot, however, ascend from the known and visible to the unknown and invisible. As to the relative share taken by the sympathetic and cerebro-spinal systems, we must be in doubt until physiologists determine the character of the dilator nerves.

CHAPTER XII.

DO MENTAL STATES, ESPECIALLY THE EMOTIONS, ACT INDIFFERENTLY
UPON THE SEVERAL ORGANS AND TISSUES OF THE BODY?

To a considerable extent we have already answered this question in the negative, but we wish to refer more definitely, although briefly, to this important aspect of the inquiry.

While popular sentiment, ancient and modern, recognizes tolerably definite relations between the several emotions and the bodily organs, there has been a marked diversity of sentiment among physiologists, except in reference to such glands—the lachrymal, the mammary, and the spermatic—as are obviously related to special Emotional states.

Lactantius, referring to the very widespread notion among the ancients that Anger or Desire is placed in the gall, Fear in the heart, and Joy in the spleen, despondingly observes that “the acuteness of human sense is unable to perceive these things, because their offices lie concealed; but we cannot, however, prove that they who discuss these things speak falsely.” “I know,” says Müller, “no single proof, but only tradition, that in the healthy man, a passion acts more upon one organ than upon another. No special passion acts regularly upon the stomach or the heart; in a sound person their effects extend *radiatim* from the brain over the spinal cord, and over the animal and organic nervous system.” And Dr. A. Zeller observes, “In the affections it is shown that the entire body is a psychical organism, and only a false tradition makes the special passions act exclusively upon special organs. Only in the affections, which require a distinct member for the realization of an urgent idea or craving, does a special current towards that organ occur.”

In direct opposition to these opinions, we find Domrich stating that “the assertion that the several movements of feeling do not affect the special organs of the body in a different manner, both quantitative and qualitative, is one-sided and in contradiction to the

experience of life; it is not true that Sorrow and Joy stir the heart in the same manner; it is an error to say that every passion may rise into weeping; it is false to say that only in the case of those who already have diseased liver, or an innate and excessive tendency to disease of the liver, does Anger disturb that organ. Who by unprejudiced examination would ever come to the conclusion that the bodily phenomena of amazement and of cheerfulness, of persistent, heart-breaking sorrow, and of unrestrained joyousness, are the same? The more the affections are considered without prejudice, and the more closely they are psychically analyzed, the more firm is the conviction that as well the kind of excitement as the most special nervous lines in which that stimulus proceeds are peculiar to single emotions." In the same direction Damerow expresses himself: "An entirely distinct consideration is required in connection with the bodily effects of the emotions and passions, for the altogether individual, special, constant, or varying influence upon this or that organ."¹

We have referred to the opinion of the ancients that Fear has its seat in the heart, doubtless from the palpitations caused by this emotion. Others spoke of courage and warmth of feeling as functions of the heart, just as popular language speaks of "being of good heart," and recognizes as "a hearty fellow" one whose feelings are fervid. "Homines splene rident, felle irascuntur, jecore amant, pulmone loquunt, corde sapiunt." And similarly, with a difference:

"Cor ardet, Pulmo loquitur, Fel commovet iras,
Splēn ridere facit, cogit amare Jecur."

"The Heart doth burn, the Lungs do speak,
The Gall to ire doth move,
The Spleen or Milt doth make us laugh,
The Liver makes us love."

(MIZALDUS.)²

It is singular to find an idea associated with the spleen so entirely opposite to that usually current. Indeed, the idea of there being any relation at all between this organ and some dis-

¹ For the foregoing opinions of Müller, Zeller, Domrich, and Damerow, I am indebted to Delitzsch.

² I owe these lines to an anonymous book published in 1659, *A Thousand Notable Things*.

position of mind is very singular, considering the obscurity in which its functions have been veiled.

Let us now, passing from these conflicting sentiments, state succinctly what we really know in regard to the particular direction of the Emotions:

1. It is admitted, in the first place, that, as respects some glands, one Emotion will specially influence them; that, for example, there exists a specific relation between Grief and the lachrymal glands, as also between maternal tenderness and the mammary glands. Rage appears to act more directly upon the salivary secretion than upon any other.

2. Again, it is equally certain that the Emotions do not act *exclusively* upon any one organ. This is true even of those which are admitted to be directly related to special glands; and of the rest, not only do they not act exclusively on a single organ, but the organ most affected is mainly determined by conditions which are independent of the distinctive character of the Emotion.

3. As any Emotion may act upon any organ, it is not surprising that the same Emotion may induce different diseases, and *vice versa*; but this is not in the least inconsistent with the position that, under the same circumstances, the same Emotion may aid in producing the same disease. Of these conditions, one is the temperament or diathesis of the subject of emotional excitement, another is the presence of actual disease in an organ.

4. Different persons may be differently affected by the same Emotion—a corollary from the preceding remark respecting temperament.

5. As regards the action of the muscles in Expression, it has been shown that certain emotions affect the same muscles in all. Laura Bridgman did not require to be taught how to mould her features in Joy, Anger, etc., the particular character of the muscular contraction in Emotional expression being stereotyped by heredity.

6. Bain makes the forcible observation, that acute Emotions, as Wonder, stimulate the movements; massive Emotions, as the Tender Feeling, are more connected with the action of glands (lxxix. p. 8), a remark which may be applied to disorders of the motor and secretory systems.

7. Certain Emotions, as Fear, affect the action of the heart in all, both in health and disease.

8. Shame specially affects the skin, more particularly the cheeks. It is a common remark that while the blush of Shame commences at the cheeks and ears, that of Anger first flushes the eyes, that of Love the forehead.

9. It is generally held that the abdominal viscera are affected most by the painful or depressing Emotions, and the thoracic viscera by those of a pleasurable or stimulating character. There is a measure of truth in this, but it is certainly far from being a universal rule. Grief affects the heart very injuriously; and what is the sigh of Melancholy, but a sign of the influence of Sorrow upon the respiration? So of the breathlessness of painful suspense. Joy, on the other hand, produces an effect upon the liver and stomach. Still, this opinion derives much support from the fact that the most striking effects of Joy on the body are undoubtedly those referable to the heart and lungs, while Sorrow has a very certain influence in disordering the digestion. It is justly expected that a man should be "off his meat" from receiving mournful intelligence, while no one supposes that it will cause bronchitis. It may, indeed, induce an attack of asthma, but for once that it is followed by this affection it will induce loss of appetite hundreds of times.

10. In reference to ancient and popular notions about the connection between Anger and the liver—"felle irascuntur"—it may be observed that while they were chiefly, if not wholly, founded on the supposed influence of bodily disorder upon the state of the mind, the existence of such a relation, if established, would imply the converse action, the influence of the mind upon the bodily organs, and would assist us in endeavoring to trace such special relationships. Thus, the opinion that a disordered liver, more than a diseased lung, renders its possessor irascible, might fairly lead us to suppose that Anger more immediately acts upon the liver than the lungs.

11. On the same principle as affections of the heart frequently induce anxiety of mind, we think that Anxiety would be more likely, *cæteris paribus*, to cause cardiac than hepatic disease.

12. Again, in regard to the lungs, a sanguine condition of mind is proverbially associated with phthisis, and conversely it may be said that Hope and Joy exert a marked influence over the respiration. However, these emotions, as we have seen, affect other organs in a striking manner also; so that it is only within

a very limited range that we can successfully carry out the parallel, or, rather, reverse the physico-psychical phenomena. The intimate connection between the viscera themselves also interferes with the isolated action of emotional excitement.

To sum up: broadly speaking, the Intellect primarily dependent upon Sensation for its perceptive and intellectual functions, is in the closest relation with the nervous system; Emotion, so strikingly operative upon the Organic Functions, exercises a special influence upon the glands and tissues, developed from the mucous membrane; and Volition, having Motion for its main functional result, acts principally upon the muscular fibre. Intellect—nerve—Sensation; Emotion—the skin, glands, and alimentary canal—Organic Functions; Volition—muscular contraction—Motion; these, it will be seen, in glancing through this work, do bear a broad special relation one to another, one which, if not unduly pressed may with advantage be present to the reader's mind while employed in the study of psycho-somatic phenomena. It may, however, be stated with more truthfulness that, while the Intellect confines its operations mainly to the brain, although capable of exciting motion and the organic functions, the Emotions act with by far the greatest force upon the heart and lungs, the vessels and the glands; and the Will, powerless in regard to these tissues and organ, exerts its influence over the muscles engaged in the motions of the body.

Probably we cannot go much beyond these general principles, which, combined with the law that any emotion, that either by its character or its suddenness, depresses the activity of the controlling power of the cerebrum, allows of the irregular or excessive action of the encephalic, spinal, or sympathetic nerve-centres, will generally serve to explain the changes induced in the body by varying mental, especially emotional, states.

PART III.

VOLITION.

CHAPTER XIII.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

IN the Chapters on the Influence of the Intellect and the Emotions, we were led by the interest of the subject (that of illustrating by Cases, systematically arranged, the action of Mind upon Body), to enter at some length into their psychology and physiology. In regard to Volition, however, we shall speak more briefly, inasmuch as we have, under other terms, treated of what by many is regarded as belonging to the province of the Will.

Some confusion in regard to the term itself has, no doubt, arisen from not distinguishing between the wish or desire to do a certain thing (in accordance with the etymon *voluntas*), and the power to perform it. A man wills to walk, but his will is powerless to move his legs; yet the Will in the sense employed in the first clause, is in full force. It is the motor centre which is in a morbid condition or paralyzed. On the other hand, when a physician says that, in a case of hysterical paralysis, the Will is paralyzed, he means that the very wish or desire to move a limb is wanting. Indeed, Reid says that, "as it is unusual in the operations of the mind to give the same name to the power, and to the act of that power, the term Will is often put to signify the act of determining, which more properly is called Volition. Volition, therefore, signifies the act of willing and determining, and Will is put indifferently to signify either the power of willing or the act." Then, again, there is more than the mere employ-

ment of "the Will" in two different senses; there is a real divergence of opinion as to whether it constitutes an independent and separate mental faculty, or is the balance of all the other faculties—that which finally results from the struggle continually going forward in the mind between the contending functions of Thought and Emotion.

Gall held that the Will resulted, not from desire alone, but from the combined operation of desire and intellect. "That man," he says, "might not be confined to desiring merely, but might will also, the concurrent action of many of the higher intellectual faculties is required; motives must be weighed, compared, and judged. The decision resulting from this operation is called the Will" (xxii., vi. p. 267).

John Mill observes, "That the idea of an action of our own, as cause, strongly associated with the idea of a pleasure as its effect . . . excites to action. It is called Will" (xix., ii. p. 328). He then points out that, with the Will as a Cause and the action as an Effect, men have not been content, but have added an item called Force or Power, which comes between the two, as itself the proximate cause of the action. The action of a muscle, according to Mill, takes place in consequence of an appropriate idea, our power of willing not being immediate over a muscle, but consisting in the power of calling the idea into existence. The only circumstance distinguishing voluntary from involuntary actions is Desire. This analysis is accepted by Mr. J. S. Mill, so far as it applied to voluntary acts produced by motives of pleasures and pain, but as insufficient to explain those bodily movements, the consequence of which is pain and not pleasure, and he refers to Bain as probably the first psychologist who has succeeded in effecting a complete and correct analysis of the Will. Bain separates from the movements brought forward by James Mill, those which are of reflex and consensual character, and those which arise from Imitation, Expectation, and Imagination. It is among the movements excited by the last class, that we sometimes observe the remarkable tendency to act even in the direction of pain, to which reference has just been made. Thus, the sight of a precipice may, from the operation of the idea aroused, lead to the painful result of precipitation. The law at work here has been referred to when considering the tendency of ideas to result in corresponding acts, as exhibited in Sympathy and Imitation,

page 50. The automatic action of the hemispheres is the physiological aspect of the law. Having withdrawn these three classes of cases of mis-called voluntary power, Mr. Bain considers that J. Mill's position, that there is a power in pleasure as such, and in pain as such, to stimulate muscular movements with reference to the pleasure or pain, is the nearest approach he has made to a clear statement of the law of Volition. "The element of the Will remaining unexplained is the *selection* of the proper movements in each case, as when we start up and walk in the direction of a pleasing sound" (xix., ii. pp. 385, 389). For this he refers to two laws—the spontaneous beginning of movements, and the retentive or associative process. The former implies the tendency to act, not from sensation, but "by virtue of the fund of power residing in the active organs themselves." The latter implies that after a certain number of accidental associations between such actions and particular sensations, the above law of pleasure and pain retains or continues them when once begun. "The concurrence is fortuitous; the prolongation of it is not fortuitous, but follows the law of the Will—the abiding by whatever movement is giving pleasure."

The arguments adduced by Bain in favor of his theory of spontaneous action of nerve centres are obviously incomplete, especially when the illustrations are criticized from the point of view of experimental science; and since it is well known that removal of all external stimuli leads to fewer and fewer movements or actions on the part of the subject of experiment, it is fair to assume that complete withdrawal of such afferent impressions would be followed in all probability by cerebral inaction. The theoretical poverty of the theory of spontaneity of action is obvious since there is no reason why, when a selection has to be made (the example referred to by Bain), the spontaneous overflow of nerve force should pass down any channel in particular, and the *reductio ad absurdum* would be found in the event of its discharging equally in all directions, under which circumstance it is to be presumed that complete inaction would result.

The direct antecedent of an act of Volition is something more than the idea of the action to be performed; it may assume various forms, although all have the common object of gaining pleasure and escaping from pain.

In some able papers "On the Nature of Volition Psychologically

and Physiologically Considered," published in the *Psychological Journal*, 1862-3, Lockhart Clarke combats Bain's views as too exclusive, and he points out that they are essentially included in Hartley's proposition that "If any sensation A, idea B, or muscular motion C, be associated for a sufficient number of times with any other sensation D, idea E, or muscular motion F, it will at last excite D, the simple idea belonging to the sensation D, the very idea E, and the very muscular motion F," a law of association by which originally automatic acts become voluntary. "That this *accidental* association is the means by which a great number of movements necessary for the alleviation of suffering and the procuring of enjoyment are originally discovered by the infant, there can be no doubt, but that this is the *only* means—that *all* such movements, in fact, and still more, that every kind of voluntary action must, as Mr. Bain contends, 'wait upon the *accidents* and improve them when they come,' so that *without these accidents* 'voluntary control could not find a starting-point'—appears to be entirely opposed to what may be observed and learned by every day's experience;" and he adds that there is an infinite number of movements which "have no immediate connection with physical pleasure or pain, but are expressly intended to be subservient to the endless variety of desires that are excited by the wants, tastes, or ideas constantly arising in the course of our daily avocations and transactions in life, and which frequently require, in accordance with the end in view, such a peculiar and complex combination or coördination of muscles as never could have occurred accidentally, and which nothing but repeated trials could possibly accomplish." Thus, as expressed by Clarke, the execution of by far the greater number of particular movements by volition "is not learned by a previous *accidental* association of those movements with particular *accidental* sensations," but "by the association of certain efforts or impulses with the requisite muscular coördination, discovered on trial, and rendered perfect by repetition;" in short, those instinctive impulses which in the infant excite muscular contraction *without* the intervention of any idea, are similar to the subsequent desire, wish, or inclination, aroused by external objects, which in combination *with* the idea of the action to be performed, constitutes the Will or Volition.

But in believing that instinctive impulses may in the infant determine action without the intervention of any idea, Clarke

has either employed Bain's theory of spontaneity of action, or adopted the truer explanation, viz., the causative influence of heredity and education. An "instinctive impulse" leading to a somewhat complex action, is but the acme of a reflex cycle, the afferent and efferent channels of which are polarized permanently, as a rare characteristic, by the prolonged action of heredity. The perfection of muscular coördination which he states is attained by constant repetition, finally brings the act down to the condition of a simple reflex action, some considerable distance below the level of an act of Volition.

Should this be the correct mode of regarding its nature, it is obvious that the Will is not a special faculty, independent of the other mental faculties, but that it is composed of an emotional or active element, and an intellectual or regulative element, the balance of which results in a volitional act. While, then, we speak of volitional states of mind, it must be remembered that ideas and emotions coöperate to constitute volition. We think, but our thoughts alone do not result in action, unless some feeling, or rather the desire to do a certain act, which is generated by the feeling, is present. While, however, it is true that volitional acts necessarily arise from complex combinations of the various emotions and intellectual faculties, it is not the less true that our feelings and trains of thought may be controlled and directed—that is to say, one motive may modify or neutralize the force of another motive.

It is not difficult to understand how one motive ("desire," J. S. Mill) may neutralize another when the two are brought into consciousness at the same time, but the subjective sensation or idea of the existence of a controlling force, which is commonly called the "Will," is not so easily accounted for. In fact, it is only cases in which this agency is felt to be employed, that can properly be considered as examples of Volition, although many lower grades of nerve action have also been included by Bain and others. Without, however, attempting to account for the present idea of the existence of a directing force, it may not be out of place briefly to review here the mechanism of actions which are accompanied by intelligent consciousness; that is to say actions, the inspiring motives of which are reasoned over, and the whole fixed in memory. Assuming that rational consciousness occurs when the occipital, as well as other portions of the cerebral cortex,

is in active function, it is easy to understand (see Diagram II) how that the nerve energy aroused in a terminal end organ (Ey) passing to a sensory perceptive centre in the cortex will from there radiate (if sufficiently powerful) to the reasoning portion of the cortex (Rc), and also to that part which is most concerned with the emotions (Ec). Thus the motive is reasoned upon and one of the emotions may be aroused. Supposing muscular action to ensue it will result in consequence of the nerve energy spreading along the arcuate fibres to the parietal portion of the cortex, the motor area, from which motor impulses descending by the direct (motor) tract to the spinal cord will ultimately stimulate the muscle after passing through the anterior cornua of the spinal cord and motor nerves. Perhaps, in addition, further action may result from collateral disturbance of the corpus striatum (Cs). This would seem to be the explanation of certain acts supposed to be voluntary, and the investigation alone of the circumstances under which they are performed, show distinctly that the character of the resultant muscular action is based entirely on precedent acts, or due to hereditary inclination, that is, the tracks $a' b' c'$ are all stereotyped, polarized by previous (often frequent) similar exhibitions of nerve energy. So-called exercise of the Will in choosing between two motives, resolves itself in such cases into the fact of the resultant nerve energy following along either tracts $b' c'$ or $\beta \beta' \gamma \gamma'$, just according to whichever offers a line of least resistance, or, in other words, is most favorably polarized, a condition popularly expressed under the terms inclination, etc. It follows from this that a very large number of so-called voluntary actions are really examples of highly complicated reflex cycles, and that when the habits, education, and hereditary "instincts" of a person are known, his actions under varying circumstances may be predicted with very fair accuracy by the same theoretic method of explanation. Practically we assume in life, that the same persons will, under the same circumstances, act in the same manner.

It certainly is, however, a very difficult thing to understand how this control is exercised, easy as it may be, in accordance with the foregoing view, to explain how the decision is arrived at to exercise it, whether in regard to the mind or the body. Lockhart Clarke, after quoting Brown's observation, "Volition is not desire itself, but exertion in consequence," remarks, "Volition is

the immediate result of a *desire to act*, which is *not checked* by some stronger or at least *more influential desire*, arising out of some feeling or emotion that *reacts through intelligence* for the attainment or avoidance of its object, and what is called the *exertion* of volition or the sense of effort, is the coincidence and approval of the intellect in the felt impulse, and the consequent combination and concentration of both in the desire itself, or upon the desired end." The reader will find the arguments in favor of this view of the nature of Volition most clearly laid down in these papers by Dr. Clarke, and those in support of a distinct faculty in the works of Locke and Reid.

As is well known, the earlier Stoics held, in opposition to the prevalent view, that man's nature and propensities are forced upon him by the necessity of a universal fate. Chrysippus compared human actions in their relation to the disposition to a stone rolling down the mountain-side, which derives its first momentum from without, but whose course depends on its weight and figure (ex., iii. pp. 555-6, and *Plut. de Stoic.*, Rep. 23, *Cic. de Fato*, 10 and 18).

We find Plato in the *Laws* (Bk. ix.) representing the Athenian Stranger as saying "In all States and by all legislators whatsoever, two kinds of actions have been distinguished—the one voluntary, the other involuntary, and they have legislated about them accordingly," upon which passage Jowett remarks, "The great question of the freedom of the Will is approached both by Plato and Aristotle, first from the judicial, secondly from the sophistical point of view. Their want of clearness in treating the subject is to be attributed to the difficulty which they experience in disentangling the abstract from the concrete" (*Jowett's Plato*, v. p. 182). Aristotle divided Desire into rational and sensuous, the former being the Will (*βούλησις*). According to him, whichever we obey, we act equally with free will and are consequently deserving of praise or blame. For the principle of action, he argues, is internal, and it lies within man's power to follow reason or not, so that he himself is the author, as the case may be, of his own virtue or vice; for otherwise he proceeds to say it would be idle to exhort man to virtue and alike unjust either to punish or reward him (ex. p. 258, *De An.*, c. 9, and *Eth. Nic.*, iii., 1, 3, 7, 8).

Whatever, then, may be the true physiology of the Will, the ancient distinction between voluntary and involuntary acts will remain practically unaffected. No one, in fact, be he ever so strong a determinist, escapes from the distinctive use of these or synonymous terms.¹ The alienist physician must distinguish, whatever be his theory of Volition, between acts performed involuntarily and voluntarily. Were all deeds alike involuntary and unavoidable, responsibility would cease and every prison would be converted into a lunatic asylum. Differences in will-power in different persons must be admitted. We must hold with Tyndall that "we are capable of acting within certain limits in accordance with our wishes," with Professor McKendrick that the "highest of all our mental states is what may be called the power of the Will," and lastly with Mill that "we have real power over the formation of our own character—that our Will, by influencing some of our circumstances, can modify our future habits or capacities of willing," although after all we are but too painfully conscious of the "certain limits" referred to in even the noblest and most gifted of our race.

We may now briefly refer to a few of the various opinions which have been held by physiologists as to the encephalic seat of the Will. Gall, while endeavoring to find organs for all the mental faculties, maintained, consistently with his opinion that the Will was the outcome of the combined operation of the intellect and the desires, that there could be no distinct organ for the Will. It is nowhere, and yet everywhere; in no special locality, in all localities of the brain, so far as its function is mind. And would not this be essentially the teaching of the physiology of the present day? This must not be confounded with the encephalic centre of motion, upon which the Will is impressed in muscular movements. Endless confusion has arisen here from confounding reflex with volitional acts. "The Will," says Brown-Séquard, "or at least, *the faculty under the influence of the Will*, by which the so-called voluntary movements are produced, is considered by

¹ Thus Mr. Bain, in speaking of Belief, employs the following language: "Whatever may be true of the internal conviction, the outward profession of belief is voluntary, and so are the actions consequent upon what we believe" (lxxix. p. 503). And again, "It is in the power of my will to open or shut my eyes, although what I am to see when I do open them is not voluntary" (p. 504).

Gerdy, Müller, Longet, and others, as having its organ in the pons Varolii and in the brain. The reasons given by these writers to prove their views are far from being satisfactory" (lviii. p. 231). Flourens held that the cerebral lobes alone are the seat of intelligence and volition (in the sense of the motor centre), a conclusion Brown-Séquard opposes on the ground that the corpora striata constitute the centres of voluntary motion, as maintained by Tood, Carpenter, and most physiologists of the present day. Many French physiologists, however, maintain that the pons Varolii is the centre of volition as well as sensation. Dr. Carpenter observes that "all those muscular movements which result from *voluntary* determinations, have their origin in the vesicular substance of the hemispheres, though the motor impulse is immediately furnished by the automatic apparatus, upon which the cerebrum plays," *i. e.*, the corpora striata, although the motor tract itself does not appear to have a higher origin than these ganglia, "and it is impossible to imagine that the fibres which converge towards the surface of these bodies from all parts of the cerebrum, can be so closely compacted together as to be included in the motor columns of the spinal axis. The fact would rather seem to be that these converging fibres (Reil's "nerves of the *internal* senses")¹ bear the same kind of anatomical relation to the corpora striata and the other sensorial centres of motor power, as do the fibres of the afferent nerves which proceed to them from the retina," etc. (viii. pp. 747, 776). Hence, instead of acting immediately upon the motor nerves, the impulse from the psycho-motor centres is first directed to the motor ganglia, exciting there the same kind of response as is given to an impression transmitted from without through a sensory nerve. Schroeder van der Kolk also says, "The orders of the Will do not pass directly into the motor nerves, but into ganglionic cells, whence the peripheric action arises from the movements of the muscles" (lvii. p. 137). Moreover, it is very doubtful if we can "voluntarily" cause only *one* muscle to act at any time. It will be granted that it is easy to show in the case of vocal sounds that we have no direct power over the muscles of the larynx, but it is in fact the same with all so-called voluntary movements (cf. viii.,

¹ First projection system of Meynert.

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cit.). The Will determines, but the automatic apparatus executes. First, the ideational and motor centres in the cortex; then the automatic action of the corpora striata. The volitional impulse is transmitted thence through the anterior tracts of the *corpus cerebri*, the anterior pyramidal columns, and anterior portion of the olivary columns of the medulla oblongata, and the anterior columns and posterior portion of the lateral columns of the spinal cord.

CHAPTER XIV.

INFLUENCE OF THE WILL UPON SENSATION, THE VOLUNTARY AND INVOLUNTARY MUSCLES, AND THE ORGANIC FUNCTIONS.

Section I.—Influence of the Will upon Sensation.

THE reader will find in the Chapter on the Influence of the Intellect on Sensation, various illustrations of the power of Attention strongly directed by the Will to a particular region of the body. It is not, however, so much that the individual wills that certain sensations shall arise, as that he voluntarily directs his thoughts to certain parts of the system. The term Will is here employed in a somewhat confused way to describe two different ideas. It is true, as has already been said, that when we say we act upon the muscles by Volition, the expression is not, strictly speaking, correct, and that the Will only excites the actuating ganglia from which the motor nerves proceed; but when we act on a muscle by simple Attention, that is, only willing the direction of the attention, not the muscular contraction, we are conscious of a very different mental act. In fact, the difference in the nature of the act is clearly shown in the different result, for the motor ganglia with which the voluntary muscles are in relation are scarcely at all affected, while the centres of sensation and the nerves supplying the involuntary muscles are notably excited. While, therefore, in an act of Attention followed by corporeal effects, the Will in one sense may be said to operate upon the body, it is much less truly so than when the Will directly acts upon the body, however true it is that even in that case the action is not direct.

Whether the above distinction in regard to the Attention be correct or not, we may call the following case an illustration of the influence of the Will, as direct as can well be imagined. Hyacinthe Zanglois, a distinguished artist of Rouen, who was on intimate terms with Talma, told M. Brierre de Boismont that

"this great actor had informed him that when he entered on the stage he was able, by the power of the Will, to banish from his sight the dress of his numerous and brilliant audience, and to substitute in the place of these living persons so many skeletons. When his imagination had thus filled the theatre with these singular spectators, the emotions which he experienced gave such an impulse to his acting as to produce the most startling effects" (lxxxii. p. 41). On this case M. Brierre remarks, "The hallucination is thus, in some cases, under the control of the Will, and would seem to be excited instantaneously."

On page 70 of this work, we referred to Newton's experience in regard to seeing the spectrum of the sun, under certain circumstances, when he meditated upon it, *without* any effort of the Will. Here it may be added, that Dr. Wigan mentions a family, each member of which "had the power of forming a voluntary image of any object *at will*, on shutting the eyes, and that each could draw from memory a representation of it, more or less accurate."

Dr. Guy, in a note to his *Hooper's Physician's Vade Mecum*, states that, "when a feeble and sickly child, I possessed the power of creating ocular spectra at will, in a very remarkable degree. I could design on the dark ground, and on a small scale, any picture, however complicated, filling in object after object with all the outlines and colors true to nature. During this period my imagination was uncommonly active in sleep, occasioning dreams of the most fearful kind. As my health improved, I lost this power of creating images at will, and since my seventh year have never regained it, though I have suffered occasionally from false impressions on the sense of hearing." With Goethe also, ocular spectra were voluntary; with Müller, involuntary.

The Will may, in some cases, influence hallucinations in the indirect way referred to in a case reported by Griesinger:

"An intelligent patient (a medical student), who had throughout, hallucinations of the left side during a violent attack of insanity, had the impression that the voices did not come from the immediate neighborhood; he had estimated them at a distance of several minutes. He also made the remarkable declaration that he could, by his belly, exercise voluntarily an influence on the hallucinations of hearing. On closer investigation it was seen that he meant the respiratory function of the abdominal muscles,

and that it was by means of the respiration that he exercised the influence. On holding the breath, the voices were often changed—appeared to come from a point nearer or more distant. We know that in expiration, the cerebro-spinal fluid arises from the spinal canal into the cavities of the brain and subarachnoid space (owing to the filling of the numerous venous plexuses of the canal of the spinal marrow), and that it again subsides during inspiration" (lxxxi. p. 90).

In Mr. Galton's recent work already referred to (page 72), he observes in speaking of those who have a complete mastery over their mental images, "They can call up a figure of a friend, and make it sit on a chair or stand up at will; they can make it turn round and attitudinize in any way, as by mounting it on a bicycle or compelling it to perform gymnastic feats on a trapeze. They are able to build up elaborate geometric structures bit by bit in their mind's eye, and add, subtract, or alter at Will and at leisure. This free action of a vivid visualizing faculty is of much importance in connection with the higher processes of generalized thought, though it is commonly put to no such purpose, as may be easily explained by an example. Suppose a person was suddenly to accost another with the following words: 'I want to tell you about a boat.' What is the idea that the word 'boat' would be likely to call up?" (op. cit. p. 109). After giving several illustrations Mr. Galton says, "that with one person, a philosopher, the word aroused no definite image, because he had purposely held his mind in suspense, and had vigorously exerted his Will not to lapse into any one of the special ideas that he felt the word boat was ready to call up, such as a skiff, wherry, barge, launch, punt, or dingy. Much more did he refuse to think of any one of these with any particular freight, or from any particular point of view." Hence Mr. Galton concludes that the habit of suppressing mental images must be a characteristic of men dealing much with abstract ideas. In fact, the power of visualizing among philosophers dies of inanition. It might have been expected, and it is actually found to be so.

A medical friend, now dead, had a remarkable power of voluntarily visualizing faces, sometimes those of persons he had once known, sometimes not. I induced him, as he was an excellent draughtsman, to draw these figures, and I exhibited them at the annual meeting of the Medico-Psychological Association, in 1874.

The influence of Volition on common Sensation is illustrated by the following case: A distinguished physician in the province of Anvers, is able to produce at any time of the day, in any part of the body, by his Will, a more or less severe pain, variable in intensity, and the ease of inducing it, according to the part of the body. In the joints the pain irradiates to every part of the limb below; in the cervical region to the whole head; in the back, there is a sense of constriction in the chest; if in the loins, there is pain in the abdomen. It is, however, in the palms of the hands that these effects of the Will in inducing sensation are best marked. Elsewhere the pain disappears whenever the Will producing it ceases to be exerted, but in the hands the pain persists for a long time and even smarts severely, and he can only escape it by a powerful distraction of mind. It must be added that during the time the doctor induces this pain in a part of his body, the pulsation of the vessels is sensibly increased in the locality¹ (xlvi. p. 132).

Section II.—Influence of the Will upon the Voluntary Muscles.

The influence of the Will on the muscles has not, for us, the same interest as that of the involuntary action of ideas and of the emotions, inasmuch as it mainly refers to those ordinary movements which, from their essential and patent character, constitute in the popular mind the typical examples of the influence of Mind upon Body, and which require no illustration, and but little commentary beyond what has already been made in the previous chapter.

The acknowledged conditions upon which the successful exercise of the Will upon the voluntary muscles depends are—that there should be a clear conception of the thing willed in the hemispheres; integrity of the descending fibres, motor centre, and centrifugal nerves; and, generally a full belief in the power to exercise the Will.

The power of the Will over the voluntary muscles, as shown in the successful attempts to stimulate nervo-muscular disorders, should not, however, be overlooked in this section.

¹ These facts are given by the medical man referred to, in a letter to Dr. Warlomont, of Brussels, dated December 30, 1874 (xlvi.).

There are two admirable instances to which we will briefly refer; the one that of Dr. Calmeil, of Paris, the other that of a malingerer, who has recently made himself notorious in the London Hospitals. Esquirol maintained that no one could successfully feign an attack of epilepsy, not even those who were thoroughly familiar with all the symptoms. "One day," says Trousseau, "Dr. Calmeil and I were talking with Esquirol on this very subject, at the Asylum of Charenton, when suddenly Dr. Calmeil fell down on the floor in violent convulsions. After examining him for a moment, Esquirol turned round to me, exclaiming 'poor fellow! he is epileptic!' But he had no sooner said so, than Dr. Calmeil got up and asked him, whether he still insisted on thinking epilepsy could not be feigned?" (liv., I., p. 42). The doctor's reply is not given. This illustration shows, not only the power of the Will in throwing the muscles into seemingly convulsive action, but the shallowness of the objection sometimes made against hypnotic phenomena, that they *may* be feigned, and, therefore, they probably are so, or at least that it is so difficult to distinguish between the false and the genuine that it is not safe to accept them as facts. Mr. Braid used to say that if any one was silly enough to play a trick upon him, it was quite possible he might be deceived. The inference that Braidism is an imposture, is just as reasonable as to infer that all epileptic seizures are feigned, because Calmeil succeeded in deceiving so practised an observer as Esquirol.

The other case referred to, will be found reported in the *Lancet*, for February 17 and April 13, 1872. The patient, who usually professed to have been a medical man, contrived to deceive "many physicians and surgeons of great eminence," so well did he force his muscles to assume the condition of paralysis, convulsion, or rigidity, which he desired to stimulate. "Who," says the above journal, "would have believed in the possibility of simulating tetanus for a week or ten days, or more?" and adds that "the case has always excited the greatest interest both in professors and students, and the notes have always been taken with that care and voluminousness which the rarity of the case demanded. . . . His symptoms were usually those of hemiplegia, with great rigidity of the paralyzed muscles, and tetanic spasms of the opposite side. On one occasion he presented the appearances of true traumatic tetanus, and the surgeon under

whose care he was at this time, said he could hardly discover a flaw anywhere in his imitation. During one of his series of simulations, a very large and painful carbuncle formed on the back of his neck, and his life was really endangered, his pulse being 150. He was evidently alarmed at his condition, and his strength was much reduced; *and yet he never forgot his opisthotonos*, but pertinaciously ground his carbuncle against his pillow." As showing the influence of Mind over Body in another way, one physician observes, "I think the case an interesting one, for he is clearly not an ordinary rascal. He must have much of that mental condition seen in hysterical women." It having been observed at one hospital that, notwithstanding the tetanic spasm of his limbs, the muscles of the abdomen were lax, these became subsequently as hard as boards." In one hospital he presented all the appearances of left hemiplegia. A few days after admission he became affected with convulsive spasms of the paralyzed side. "The gradual onset of his symptoms from slight, at first, to the most grave in the end, was admirably assumed, and was so like the book description of 'ingravescent apoplexy,' that the idea of imposture seemed really absurd." During the same year, having fallen down in "a fit," near St. Paul's Churchyard, he was taken to a hospital, where, soon after admission, paraplegia appeared. Some months afterwards, he fell down again in London, and at another hospital was treated for hemiplegia during two months. Three months later, he was admitted at a provincial hospital with well-marked symptoms of hemiplegia, the paralyzed limbs being rigid. In less than a week, he stated he felt much better, and wished to be discharged. On the same day he was seen walking about the streets perfectly well. He was subsequently a patient in at least four more hospitals, and was very successful in his simulations. In one instance "he had an attack of tetanus, complete in every particular. Every spasm was noted, and it is certain that the amount of sleep which he got during the time was incredibly small. A student sat up with him almost every night, and the slightest changes were taken note of and reported. We are told that it was really beautiful to watch the effects of remedies in relieving the poor patient's agonies. On the 19th, he left the hospital in a fit of indignation, because he heard a nurse say she thought he was shamming. During his fourteen days' sojourn, he consumed two hundred and

thirty-four ounces of whiskey or brandy, and on the first four days he had eighteen hypodermic injections of morphia, containing one-third of a grain each.

Voluntary power over the muscles may be lost, and yet Emotion may be able to excite their action; and, *vice versâ*, emotional influence may be suspended and voluntary power remain.

Thus, a gentleman, known to me, is the subject of paralysis of the nerves supplying the tongue and palate. The affection came on rather suddenly, but, for many years before, he had suffered from the effects of a serious accident to the head in consequence of which the brain was permanently injured. There was not, however, any sign of paralysis. The paralytic attack above mentioned was marked by inability to articulate or to chew his food, while the muscles supplied by the *portia dura* and the third pair were unaffected. He had no difficulty in expressing himself by signs or in writing. This state has continued for several years without material alterations. Now, in this case, emotional excitement frequently has the effect of enabling him to articulate a sentence or two, although muffled in character.

Romberg gives two interesting cases illustrative of the class of facts now referred to.

The first was that of a "widow, æt. 50, who had already passed through two apoplectic attacks, causing loss of speech and paralysis of the left side, the former occurring after violent vexation. The face of the patient was perfectly smooth, without either furrow or expression. All of the muscles of the face were deprived of voluntary movement. She was neither able to contract her forehead nor her eyebrows, to raise the nostrils, nor to move her cheek and chin. She was incapable of closing the eyelids; when required to do it, she used her finger or looked on the ground, by which the eyeball was directed downwards; the levator tarsi relaxed in its contraction, and the upper eyelid also moved downwards. On the other hand, she was not able to raise or close her lips, so that the mouth was constantly opened slightly, and the saliva ran out, rendering it necessary for the patient to be constantly wiping her lip. The lower jaw was moveable, the patient was able to open her mouth and chew; but even these movements were not quite of a healthy character, for she was unable to open the mouth wide, and she was equally incapable of performing rapid movements of the lower jaw upon

the upper jaw. The tongue did not obey the Will in the least; she was neither able to protrude it between the teeth, nor to move it backwards or to the sides; it lay in the mouth like a wedge, and rendered voluntary deglutition and mastication almost impossible. The sense of taste, as well as tactile sensation, were unimpaired, both in the tongue and throughout the surface of the face. Speech was impeded, but there was not complete aphonia, for the patient was able to utter an inarticulate sound, but it was out of her power to modulate its pitch. The sound was not a distinct vowel, but something like *ang* or *ong*, for even when the mouth was wide open she was unable to say *a* distinctly, much less to articulate any other vowel."

On the other hand, while the Will could not influence the contraction of these muscles, their action was excited by direct or reflected stimulation, if we may call emotional excitement direct, and that which arose from without, reflected. A ludicrous idea—an internal excitor—at once excited the muscles employed in laughter. "The patient smiled and laughed, passing through all the shades of the movements without any difficulty, and at the same time the lip, cheeks, and nostrils went through the same movements which a healthy person can perform, but over which our patient had no control. They were as little induced by any external stimulus, as pricking or pinching the cheek. When she laughed, she was also able to produce other sounds besides those mentioned. These sounds were also inarticulate, but still they varied in their elevation according to the character of the emotion that caused the laugh, a circumstance not otherwise observed. But it became evident how little these sounds were under the voluntary control of the patient when she laughed violently; she then uttered a peculiar, grunting, animal sound, of which she was in a measure ashamed and would willingly have suppressed. She therefore tried to shorten it as much as possible; however, the sound continued even after the movements of laughter had ceased, at a time when in a healthy individual no further sound would have been emitted" (abridged from xxxiv., ii. p. 278).

This patient subsequently died of cholera, and a post-mortem examination disclosed a hemorrhagic cyst, the size of a small walnut, at the external edge of the right hemisphere; at the junction of the anterior and middle lobes.

In the following case, the Will *retained* its influence over the muscles supplied by the facial nerve, when the emotions were powerless:

The right side of the face of a girl, æt. 12, was "expressionless in emotions, and showed no increased action in accelerated respiration, after running, etc. Nevertheless, the child was as able to control the muscles on this side as those on the left; she could move the angle of the mouth, dilate her nostrils, wrinkle her forehead, and contract her eyebrows at will. There was no marked change in the sensation of the right side. The movements of mastication were undisturbed at either side when the child was regarded full in the face, while in a state of repose the mouth was found to slant, as in the usual instances of sudden peripheral paralysis of the facial nerve; but as soon as the features (of the sound side) were altered by emotions or by talking, the unequal action of the two sides of the face became manifest."

"The child was delicate, and the malady was developed gradually. Besides, there was a deviation of the vertebral column, between the scapulæ, of about one-third of an inch from the straight line to the left, and the right half of the thorax appeared sunk to the same extent" (xxxiv., ii. p. 280).

The various forms or modifications of respiration—sighing, yawning, sobbing, laughing, coughing, and sneezing—can be performed, or at least imitated by the Will; but, when not excited by local irritation, are usually induced by the mental stimuli comprised under our second division of mental states—Emotion.

Hunter, who, not only by his writings, but by the disorders of his own body, serves a useful purpose in the present investigation, had a remarkable attack, during which he was able to keep up respiration by the Will. We read in his biography that "he once suffered from an alarming spasm attended by a cessation (?) of the heart's action, which lasted three-quarters of an hour, in defiance of various active remedies suggested by Dr. Hunter, Sir George Baker, etc. . . . The immediately exciting cause was a violent mental affection. During this attack the sensation and voluntary actions continued unaffected, and Hunter continued to respire by a voluntary effort, with a view of keeping himself alive; though, as he afterwards observed, the continuance of respiration was probably of no service, as the circulation had ceased" (ii., i. p. 45).

In vocalization the action of the Will on the vocal muscles is greatly influenced by the sense of hearing, persons born deaf being unable to direct their movements so as to produce intelligible sounds. In deglutition the Will can only be said to act indirectly, namely, supplying the required stimulus—the saliva or food. The muscles engaged in urination and defecation are, of course, largely influenced by the Will. It is unnecessary, however, to do more than refer here to works on Physiology.

The Will also possesses the power of controlling, within certain limits, the reflex action of the voluntary and semi-voluntary muscles, both in health and disease, whether excited by ideas, sensations, or local irritation without sensation.

Although ideo-motor acts presuppose the Will's abeyance, and the cerebrum's automatic action, it may be said that the Will is constantly engaged, except in sleep and allied conditions, in limiting, directing, and controlling the automatic or reflex action of the brain, and the muscular movements resulting therefrom.

An involuntary malediction half escapes the mouth, and is checked by the forcible repression of the Will. In the early stages of insanity, the conflict between the Will and automatic cerebro-muscular action is often, as we all know, intense.

The influence of the Will, in controlling consensual movements, is sufficiently well shown in the familiar instance of the resistance which can be offered to the contraction of the orbicularis, if forewarned; we resolve not to yield to the attempt to startle us into winking, or to the motions which naturally ensue from tickling the sole of the foot, etc.

Voluntary efforts to control or suspend true excito-motor movements, as in respiration, defecation, etc., though for a time successful, are in the end, and in no long time, defeated by the irresistible force of the spinal nerves, or rather cord.

We may see this in animals as well as in man. For example, my cat is troubled with a bad cough, which comes on in paroxysms. The other day, when one of these attacks occurred, she heard a mouse behind the skirting board near her. Her attention was immediately arrested, and the cough ceased; the moment before in a state of distress, she was now lively and excited. After a while, however, a struggle occurred between the two forces, derived from the volitional and respiratory centres. She stood ready for a spring, and was most anxious to

be perfectly quiet, but she could not prevent occasional coughs, which would effectually frighten away her intended victim. Reflex action was not entirely under the control of the Will, but was notably checked by it.

The following simple example, occurring in John Hunter's practice, serves to show the power of the Will in antagonizing reflex action: A woman, aged forty-six, was troubled for some years with spasmodic wry-neck. This contraction of the sternomastoid it was always in her power to prevent by contracting the muscle of the opposite side, when she sufficiently recollected herself. The affected muscle did not contract itself, unless she accidentally contracted it a little, after which it continued till the full effect was produced.

A good illustration of the same power occurs when aroused from sleep by simple cramp of the gastrocnemius; we are able, by the vigorous exertion of the Will, to extend the muscle in spite of powerful reflex action to the contrary.

The suspension of the Will, from whatever cause, allows of the free play of the centres below the cerebrum, and thus explains the reflex acts which occur after mental shock.

In addition to its action through the nervous system upon the purely voluntary muscles in producing movements, the Will can exert a certain active influence over those of the semi-voluntary class engaged in respiration, deglutition, urination, and defecation.

Section III.—Influence of the Will upon the Involuntary Muscles and the Organic Functions.

The direct action of the Will upon the heart and non-striated muscles of organic life, if it can be ever exerted, is altogether exceptional, although it may powerfully influence them *indirectly*, by directing the course of the emotions and ideas to them, and in this way it may and does affect the organic functions.

The alleged occasional direct action of the Will over the heart and non-striated muscles is of physiological interest, although, if admitted, of too rare occurrence to be of much practical importance.

A distinguished Fellow of the Royal Society¹ (æt. 79) told me that he could, by voluntary effort, increase the frequency of his

¹ The late Robert Were Fox, F.R.S., of Falmouth.

pulse from ten to twenty beats in the minute. He acceded to my request to make the experiment, with some reluctance, from a sense of danger accompanying it, or at least a conviction that it was not desirable for his health. On being seated, the pulse was, I found, sixty-three, soft and regular. In the course of about two minutes, it increased in frequency to eighty-two. On requesting him to tell me how he attempted to accelerate it, he said that he could hardly describe the character of the effort, but that it seemed to be partly due to "a sort of impulse, accompanied by an internal shiver, and partly to an action upon the breathing." As, however, the mere direction of the Attention to the heart is sufficient, under certain circumstances, to increase the number of its beats, it does not seem necessary to suppose that the Will acted directly upon the muscular tissue of the heart, in the same sense as we speak of its acting upon the voluntary muscles. The writer, is not, however, able himself to increase the frequency of the pulse by the concentration of the Attention. In regard to the respiration, his experience is the same, nor was there in this gentleman's case, any apparent increase in the respiratory movements.

The case of Colonel Townsend has been often adduced as an instance of the power of the Will in controlling the action of the heart; but interesting and remarkable as the phenomenon he exhibited was, the Will possibly acted only indirectly on this organ, the cardiac symptoms resulting from a peculiar condition of the nervous system, self-induced, and resembling that occasionally occurring in Artificial Somnambulism. Dr. Carpenter inclines to this view, "for in this condition," he observes, "there is sometimes an extraordinary retardation of the respiratory movements and of the pulsations of the heart, which, if carried further, would produce a state of complete collapse" (viii. p. 1103). Calmeil thinks that it need not occasion much surprise if the Will should, in some cases, be able to suspend the action of the heart; and certainly, if in at least one instance, about to be mentioned, voluntary rumination has occurred, there is no reason why an exceptional distribution of the nerves should not have enabled Colonel Townsend to influence his heart even directly. The statement respecting him is that "he possessed the remarkable faculty of throwing himself into a trance at pleasure. The heart ceased, apparently, to throb at his bidding,

respiration seemed at an end, his whole frame assumed the icy chill and rigidity of death, while his face became colorless and shrunk, and his eyes fixed, glazed, and ghastly; even his mind ceased to manifest itself, for during the trance it was as utterly devoid of consciousness as his body of animation. In this state he would remain for hours, when these singular phenomena wore away, and he returned to his usual condition" (lxxxv. p. 231). Dr. Cheyne, Dr. Baynard, and Mr. Skrine believed on one occasion that life was extinct, and were about to leave the Colonel, when signs of returning animation appeared. They felt his pulse. "It was," says Dr. Cheyne in his *English Malady*, "distinct though small and thready, and his heart had its usual beating. He composed himself on his back and lay in a still posture some time; I found his pulse sink gradually, till at last I could not feel any by the most exact and nice touch. Dr. Baynard could not feel the least motion in his breast, nor Mr. Skrine see the least soil of breath on the bright mirror he held to his mouth; then each of us by turns examined his arm, heart, and breath, but could not by the nicest scrutiny discover the least symptom of life in him." They waited some time, and the body continuing in the same state, were about to leave, under the impression that the Colonel was actually dead, when a slight motion of the body reassured them. Upon examination, the pulse and heart were found again in action, and he gradually restored himself. His death-like state lasted half an hour, and recurred at nine in the morning, after which he transacted business with his attorney, and quickly expired at six o'clock in the afternoon; and the body, when examined, presented, with the exception of the right kidney, no sign of disease (see xxvi. p. 160).

Dr. Darwin says, "There is an instance told in the *Philosophical Transactions* of a man who could for a time stop the motion of his heart when he pleased; and he adds the case of a gentleman who could so far increase the peristaltic action of the bowels by voluntary effort, that he could cause their action at any time in half an hour" (lxxv., i. p. 39).

In this connection, the prolonged suspension of active vitality in the Fakirs, authenticated by English officers and medical men, and referred to by Mr. Braid and Dr. Carpenter, is important, as being probably induced by the Will forcibly concentrating the Attention upon one subject, and leading to a condition of the

organic functions similar, in some respects, to that of Colonel Townsend. St. Augustine gives a case of voluntary trance in the *De Civitate Dei* (Opera, Edit. 1569, vol. v. p. 796): "Jam illud multo incredibilius, quod plerique fratres memoriâ recentissimâ experti sunt. Presbyter fecit quidam nomine Restitutus in parœcia Calamensis ecclesiæ, qui quando ei placebat (rogabatur autem ut hoc faceret ab eis qui rem mirabilem coram scire cupiebant), ad imitatas quasi lamentantis cujus libet homines voces, ita se auferebat a sensibus, et jacebat simillimus mortuo; ut non solum vellicantes atque pungentes minime sentiret, sed aliquando etiam igne ureretur admoto, sine ullo doloris sensu nisi postmodum ex vulnere; non autem obnitendo, sed non sentiendo non movere corpus, eo probabatur, quod tanquam in defuncto nullus inveniebatur anhelitus: hominum tamen voces, si clarius loquerentur, tanquam de longinquo se audisse postea referebat." In hypnotism, the process suspends the influence which antagonizes that of the sympathetic over the calibre of the cerebral arteries, but this is due to exhausting the cerebrum, by straining the muscles of the eye, and by the concentration of the Attention, which are both dependent on the Will. It does not act, however, directly upon the calibre of these vessels, nor is there sufficient proof that, in any instance, the individual Will has been able to act directly upon the arteries of the body, apparent examples of this power being attributable to rigidity of the surrounding muscles, or to emotional states, excited by the Will.

In considering the possibility of the Will acting upon non-striated muscles in some instances, we must not omit to mention that Peter Frank and Blumenbach record two cases of great interest. In that related by the former, the power existed of commencing the act of rumination by the direct exercise of the Will. In Blumenbach's case a patient affected with rumination was able to arrest it by volition (xxxiv., ii. p. 14).

Voluntary rumination is incidentally mentioned by St. Augustine in the following passage, the whole of which is worthy of preservation: "Sunt qui et aures moveant vel singulus, vel ambas simul. Sunt qui totam cæsariem capite immoto quantum capilli occupant, deponunt ad frontem, revocantque cum volunt. *Sunt qui eorum quæ voraverunt incredibiliter plurima et varia, paululum præcordiis contrectatis, tanquam de sacculo, quod placuerit, integerrimum proferunt.* Ipse sum expertus, sudare hominem solere cum vellet.

Notum est, quosdam flere cum volunt, atque ubertim lachrymas fundere" (loc. cit.). Voluntary perspiration, it will be observed, also finds a place in the above enumeration.

Of the muscles concerned in vomiting, the abdominal are, no doubt, more or less under the influence of the Will; but this act differs from the semi-voluntary, such as defecation, with which it is frequently classed, in that it cannot be performed by all persons voluntarily, at one time or other, in consequence of some of the muscles required by the act being altogether of the non-striated class. Romberg states that Bichat possessed the power of voluntarily vomiting, and that Richerand cites an instance of it also. It would be interesting to know whether this power was exerted in these cases without any previous nausea whatever.

Dr. Noble, of Manchester, has informed me since the first edition of this work appeared, that he himself is an example of "human rumination" (Richerand). "I am one of those," he writes, "who have always had the power of voluntary vomiting, and it is not ever preceded by any nausea whatever. The feat is performed by depressing the diaphragm and employing the abdominal muscles, by the Will, no sickness whatever being induced."

The examples, however, of alleged voluntary control over the heart, stomach, and œsophagus, are so rare that, at most, they only prove that exceptions may occur to an almost universal rule, and are of no practical utility.

The exceptional influence of the Will over non-striated muscle, is exhibited in the power possessed by some persons of contracting or dilating the pupil at pleasure. Professor Laycock states that a gentleman now living (1860) possesses this power. He does not say whether the action of the Will was direct, or through the medium of ideas.

The case of Professor Beer, of Bonn, is thus described in the *British and Foreign Medico-Chirurgical Review*, on the authority of Budge: "He is able in the same light to contract or dilate his pupil at will. This change in the size of the pupil, however, he brings about only through certain ideas; when, for example, he thinks of a very dark space, the pupil dilates. When, on the contrary, he thinks of a very light place, the pupil contracts. He finds it more difficult to induce contraction than dilatation. Dilatation would seem easier than contraction, for Budge "has

met with several other persons who can dilate the pupil in consequence of such ideas, but not another who can contract it also." The reviewer holds that from such cases we must conclude, "not that the motion of the iris is voluntary, but that the idea of a sensation can bring forth motions as well as the actual sensation itself" (vii., 1857). Again: "Professor Allen Thompson, of Glasgow, has lately published, in the *Glasgow Medical Journal*, some remarks on the case of Dr. Paxton, of Kilmarnock, who possesses an unusual power of contracting and dilating the pupil, alleged to be voluntary and independent of any effort at adjustment of the eye. Dr. Paxton showed Dr. Thompson the motions of his iris, "alternately contracting and dilating the pupil to a great extent, with apparent ease, at will;" and he informed Dr. Thompson "that although, in producing the motions of contraction and dilatation of the pupil, he did not actually make an effort of adjustment, or attempt to fix the eye alternately on a near and distant object, yet the effort to make either of these motions seemed to him, as it were, very similar to the motions for adjustment." [Mr. Braid found that "by directing the eyes loosely, upwards or downwards, to the right or to the left, as if looking at a very distinct object, the pupils become very much dilated, irrespective of the quantity of light passing to the retina, so that in this manner we can contract the pupil at will" (vi. p. 36).] Dr. Paxton further stated to Dr. Thompson, in proof of his possessing a power greater than usual of moving the iris independently of adjustment, that he "can fix the eyes upon a near object, and, while steadily looking at it, dilate the pupil without any effort for adjustment for distant vision, and while continuing to look at a distant object he can still further dilate the pupil and contract it at will, without any attempt at adjusting the eye for near vision." In short, as Dr. Paxton himself informs me in a letter, "he can alternately dilate and contract the pupil with as much facility as he can open and shut his hand," and that, without the slightest effort at adjustment. This he can do also more rapidly than the pupil can adjust itself for near and distant vision. The pupil, Dr. Paxton says, has the ordinary action under the influence of light and shade, but he can always at will dilate it, whether the eyes be exposed to light or shade.

It is "by dilating that he must always begin the movements in question. By a slight effort of what appears to him to be relaxa-

tion, he dilates the pupil, and when the pupil is dilated, he can, by a slight effort of bracing up, contract it. Furthermore, Dr. Paxson says that it is not by raising up any idea in the mind, such as thinking of light and shade, that he calls forth the movements of his pupils, but by distinct efforts, and that he is always conscious, both by the state of vision and by the sensation in the eye, whether the pupil is in its normal condition or not" (vii., October, 1857).

More recently M. Ch. Féré has drawn attention to the action of the Will on the pupil in his "Notes pour servir à l'histoire de l'hystéro-épilepsie," in the *Archives de Neurologie*, 1882 (p. 281). He observed that in two hystero-epileptics during the cataleptic stage, when he ordered them to look (mentally) at a bird at the top of a clock or soaring high into the air, the pupils progressively dilated to double their normal size. When, on the contrary, he gave the patient the impression that the bird was descending, the pupils gradually contracted. This observation well illustrates the influence, not of the will on the pupil, but of ideas corresponding to external stimuli. Seitz-Zehender (*Handbuch der Augenheilkunde*, p. 14) is cited as reporting the case of a medical student who could dilate his pupils three millimetres by inspiring deeply, and then stopping his breath and contracting the muscles of his neck. Leiser explains this by supposing that the oculo-pupillary vaso-motor centre in the medulla is irritated at the same time as the respiratory centre, probably from the carbonic acid accumulated in the blood.

M. Féré thought it worth while trying whether the pupils of his hysterical patients would, when they were awake, respond to imaginary representations as in the case of Professor Beer, but he failed to induce either contraction or dilatation. As we have seen, the experiment was successful during the cataleptic state. Again, during this or the hypnotic condition, M. Féré possessed the patients with the idea that on a table of sombre color there was a portrait in profile. On being awakened they saw it distinctly *in situ*, and on placing a prism before them they were extremely surprised to see two profiles. Lateral pressure of the globe sufficient to disturb the visual axis also induced diplopia, as had been already recorded as holding good in an instance of hallucination in a lunatic (Brewster), and in a male hysteric (Ball).

The desperate effort to awake from partial sleep which we are at times conscious of making, might seem to be, when successful,

an instance of the influence of the Will over the vessels of the brain; but what happens? The Will acts in two ways: first, the very effort to arouse one's self from sleep, excites the inhibitory action of the brain upon the sympathetic ganglia, which, uncontrolled, cause the contraction of the cerebral vessels as referred to on page 122, of this work; secondly, the voluntary muscles are gradually excited to action. But if the brain be in the peculiar condition present in trance, there may be consciousness and the strong desire to wake, without the power. In other cases, the fearful struggle may at last end in cerebro-spinal victory, and an escape from the grip of the sympathetic. Crichton gives such a case, that of a young lady who, in this state, was laid in a coffin. "On the day of her funeral several hymns were sung before the door. She was conscious of all that happened around her, and heard her friends lamenting her death. She felt them put on the dead-clothes, and lay her in the coffin, which produced an indescribable mental anxiety. She tried to cry, but her mind was without power, and could not act on the body. It was equally impossible to her to stretch out her arms, or to open her eyes, as to cry, although she continually endeavored to do so. The internal anguish of her mind was, however, at its utmost height when the funeral hymns began to be sung, and when the lid of the coffin was about to be nailed on. The thought that she was to be buried alive was the first one which gave activity to her mind, and caused it to operate on her corporeal frame. Just as the people were about to nail on the lid, a kind of perspiration was observed to appear on the surface of the body. It grew greater every moment, and at last a kind of convulsive motion was observed in the hands and feet of the corpse. A few minutes after, during which fresh signs of returning life appeared, she at once opened her eyes, and uttered a most pitiable shriek" (lxiii., ii. p. 87). In this case the first indication of the relaxation of the capillaries, gradually freed from the excessive contracting influence of the sympathetic ganglia, was perspiration.

In concluding the consideration of the Will, it may be said that the great fact to be borne in mind in regard to the range of its operation is that, while it cannot influence (unless in a few rare cases) the organic functions directly, it can indirectly, through its employment of other mental forces, and can exert immense influence over the irregular movements of the muscles and automatic cerebral action.

PART IV.

INFLUENCE OF THE MIND UPON THE BODY IN THE CURE OF DISEASE.

CHAPTER XV.

GENERAL PSYCHOLOGICAL AND PHYSIOLOGICAL PRINCIPLES.

HAVING considered the influence of varying mental states upon the bodily functions, both in exciting their physiological and pathological action, we proceed to illustrate the effects of the same influence upon morbid conditions of the system. John Hunter only stated the truth of the case partially when he said, "As the state of the mind is capable of producing a disease, another state of it may effect a cure," if by this he meant to imply that a different kind of emotion is required to remove a disease from that which caused it, whereas the character of the mental excitor may be, and often is, the same in both instances. Fear may heal as well as cause disease. It would therefore be more correct to say that as in health certain mental states may induce disease, so in disease certain mental states may restore health.

The illustrations which we shall bring forward may seem to some a thrice-told tale and of little practical use, but they are, in the author's opinion, of great importance on several grounds, but especially so in regard to the question whether the psychical cures of disease performed by Mesmerism and kindred processes, are due to a force proceeding from A the healer to B the healed, or are simply the result of the particular mental state of B, excited by A. It is obvious that in those cases in which the individual's own emotion (*e. g.*, Fear) causes changes in the body, there can be no influence derived from the hypothetical disease-healing

emanation of another person; and if the cures are as frequent and as complete under these conditions, there is no occasion to assume that any other principle is at work in those cases in which the cure is preceded by some particular action on the part of another. If, on the other hand, it is found that although certain emotions, as Fear, exert a marked effect in removing morbid conditions of the system, the presence or contact of some individuals possesses a still greater influence; or if while an ordinary mortal can act upon a patient's disease beneficially, by designedly exciting his Imagination, his Will, or his Hope, a Valentine Greatrakes can, by the touch of his hand, exert an entire and instant influence, which takes effect in a large number of instances—an effect which is more powerful in its operation, and one asserted by him to be an accidentally discovered gift, practised without any regard to the supposed action of the Imagination—then a different principle may be suggested, but it is not proved by these circumstances, for the question still arises whether B's fear of, or faith in, A does not even then constitute the real explanation of the effects produced. A man possessing—

"An eye like Mars, to threaten and command,"

is certainly much more likely to influence the nervous system of B than if destitute of an expression indicating force of will. The strongest argument in favor of the possession of a distinct power on the part of Greatrakes is that drawn from the circumstance that the sense of an overwhelming mental force or impulse was, in the first instance, the cause of his applying his hand to parts affected with disease. It may fairly be asked, Why was he successful before there was the least reason to expect any remarkable effects from his "stroking?" This early success, taken in connection with the impulse which he experienced, ought at least not to be overlooked by an honest investigator of the success of his method, as witnessed by Boyle and other acute observers, for it is certainly the most difficult circumstance to explain merely by the action of the patient's mind upon the disease. At the same time, although it is difficult to conjecture why he had an impulse to heal by stroking, it is certain that no one could be stroked without having the attention more or less strongly directed to the seat of the disease, and that the mere process of stroking may be of great use in altering the capillary circulation of the part, in the same

way as the metallic tractors prove beneficial. In neither method must the physical element be overlooked.

But even should it be eventually shown that a power emanates from some persons as is alleged, which when applied to disease exerts a salutary influence, the cases collected in this chapter will not be useless, for they will show what *can* be done without the contact of another person, and will serve as a warning not to conclude hastily that, in other cases, different powers have been exerted. Such emanating power is not intrinsically absurd. We recognize animal electricity; and the correlation of physical forces makes it difficult to see why animal magnetism should be regarded as impossible. Only, it would be altogether unphilosophical to have recourse to this or any odyllic agency, if the phenomena in question can be explained without it. The advocates of a magnetic fluid themselves admit that the Imagination may, as regards certain phenomena, produce in some instances the same results. The most able and prominent supporter of Mesmerism in this country, the late Dr. Elliotson, says, "If a mesmeric effect has once been produced—an effect unquestionably of mesmeric agency—we cannot be sure when it recurs, even under mesmeric processes, that it is not the result of Imagination, if the patient is aware of mesmeric means being employed in order to induce it. Whether Imagination could induce a violent inflammation of the eyes, with a severe eruption on the skin, on a certain day fixed upon by the patient long before, I will not say; but that the idea of a fit of convulsions, pain, etc., occurring on a certain future day and hour, is sufficient to excite it at the very time foretold, I have no doubt, and many such apparent predictions are of this nature and no predictions at all, but results of a strong Imagination" (xxxvi., January, 1853, p. 358).

So also Dr. Gregory, the late Professor of Chemistry in the University of Edinburgh, in urging the proofs in favor of the occurrence of certain psychical phenomena independently of the Imagination, candidly admits that "the impressible state" may be caused by an appeal to this faculty. "It may be," says he, "induced by an internal change in the patient's nervous system, caused by what may be called an appeal to the Imagination, or, in other words, by the physical effects of fixed gazing on the nervous system of him who gazes." Again, "It is certain that

in the greater number of cases the impressible state is produced by means of an appeal to the Imagination of the patient, and when he is in that state, the very character of the phenomena now to be described consists in their connection with and dependence on the Imagination—that is, on mental impressions made on the patient. For this reason we call them the phenomena of Suggestion, or suggestive phenomena" (xxxvi., April, 1852).

The foregoing is equally true when applied to the cure of disease. In regard to the explanation, which some are disposed to find in Dr. B. W. Richardson's *Theory of a Nervous Ether*, of the relief of disease by mesmeric manipulations, it may be remarked that this ether might exist, but be incapable of passing from A to B, or it might thus pass and yet not be a curative agent. All Dr. Richardson suggests is that there exists, in addition to a nervous fluid, a gas, or vapor, pervading the whole nervous organism, surrounding, as an enveloping atmosphere, each molecule or nervous structure, and forming the medium of the influences transmitted from a nerve-centre to the periphery and from the periphery to the nerve-centre. This theory might be applied to explain the cure of disease by Mesmerism, so far as the means adopted may concentrate the nervous ether in one part, but this is quite a different thing from supposing that it escapes from the tips of the fingers, and exerts an influence over another person. So, in regard to the resemblance of nervous to electric force,¹ this affinity may be true, but such force may not pass from A to B. The admitted evolution of electricity in man does not appear to be present in unusual degree in those cases in which the power to heal disease by the hand is alleged to exist, and those persons who, like the lady and the monk, whose cases are cited by Carpenter in his *Human Physiology*, have an excess of electricity, are not credited with any special healing

¹ Sir Benjamin Brodie, adopting this hypothesis, observes that "the transmission of impressions from one part of the nervous system to another, or from the nervous system to the muscular and glandular structures, has a nearer resemblance to the effects produced by the imponderable agents than to anything else. It seems very probable, indeed, that the nervous force is some modification of that force which produces the phenomena of electricity and magnetism, and you may recollect that I have already ventured to compare the generation of it, by the action of oxygenized blood on the gray substance of the brain and spinal cord, to the production of the electric force by the action of the acid solution on the metallic plates, in the cells of a voltaic battery" (xxx., p. 159).

gifts. Arago is stated¹ to have arrived at the following, among other conclusions, in a report to the Academy of Sciences, on a case more remarkable than the foregoing, but I have been unable to verify the reference: "That, under peculiar conditions, the human organization gives forth a physical power which, without visible instruments, lifts heavy bodies, attracts or repels them according to a law of polarity, overturns them, and produces the phenomena of sound." Contrary to the opinion of Mr. Braid, he, according to the same report, believed that a peculiar sensibility to the magnet sometimes exists. It is to be hoped that the interest at present (1872) excited in so-called "Psychic Force" will lead to a more extended and patient examination, on the part of competent observers, of such phenomena. Whatever may be eventually proved, it will not be the less true, *first*, as regards our immediate inquiry, that if B's Expectation, Will, or Emotion, cure his disease as effectually without as with the presence of A, it is unphilosophical to assume any other curative agent to be present; and, *secondly*, that it does not follow that because the Emotion or the Imagination can cure disease, that therefore there can be no beneficial influence proceeding from A to B.

¹ Among other works, in an anonymous brochure, entitled, "The Principles of Spiritualists Exposed," 1864.

CHAPTER XVI.

INFLUENCE OF MENTAL STATES UPON DISORDERS OF SENSATION, MOTION, AND THE ORGANIC FUNCTIONS.

Section I.—Influence of Mental States upon Disorders of Sensation.

ODONTALGIA.—We all know how one common, but painful affection—toothache—is removed temporarily or permanently by Fear or by the Imagination. Familiar with instances of this kind, we can readily believe the statement made by Dr. Ranieri Gerbi, Professor of Mathematics in Pisa, in a pamphlet entitled *Storia Naturale di un Nuovo Insetto*—the insect here referred to being called by him *curculio anti-odontalgicus*. Its virtues were wonderful, for if squeezed between the fingers, they had only to be applied to the tooth to relieve its aching. Dr. Gerbi states that by this process, which clearly owed its efficacy to the Imagination of the sufferers, he cured four hundred and one cases out of six hundred and twenty-nine. I am indebted to Dr. Millingen's work for this reference. It is unnecessary to multiply examples for as notorious a fact as the magical power of the influence in question; an influence not only well known to the dentist, but to every one on his way to that dreaded personage, who, wishing to believe that the operation is not requisite, begins by doubting whether the pain is after all so very bad, and by the time he sets his foot on the step of the dentist's door, convinces himself that he is entirely free from it. And so he is; at any rate, for a time.

SCIATICA.—A singular instance of the influence of the Imagination upon sciatica may be found in a practice said to have been once common in Devonshire, related in *The Anatomie of the Elder* of Dr. Martin Blockwick, and cited in Brand's *Popular Antiquities* (vol. iii.): "The Boneshave, a word perhaps nowhere used or understood in Devonshire but in the neighborhood of Exmoor, means the sciatica; and the Exmorian, when affected therewith, use the following charm to be freed from it. The patient must

lie upon his back on the bank of the river or brook of water, with a straight staff by his side, between him and the water; and must have the following words repeated over him, viz.:

‘ Boneshave right,
Boneshave straight,
As the water runs by the stave,
Good for the Boneshave.’

They are not to be persuaded but that this ridiculous form of words seldom fails to give them a perfect cure.”

PAINFUL JOINTS.—Sir Benjamin Brodie records the case of a young lady who had long labored under hysterical neuralgia of the hip and thigh, but who immediately lost all her symptoms on being thrown from a donkey which she was riding. He adds: “Another case has been published as an example of a cure by Divine interposition—the immediate cause of it being the prayers of the patient’s spiritual instructor, and his command, ‘in the name of the Saviour, that she should get up and walk’” (*Diseases of the Joints*, 1850, p. 287).

When we see that the mental emotions caused by the fall from a donkey cure a disorder of which Dr. Copland says there are few less under the control of medical treatment, we can scarcely exaggerate the importance of attacking Disease psychologically, although we may not be justified in inducing donkeys to throw our lady patients, any more than resorting to the somewhat expensive as well as perilous remedy of setting on fire the house of any gentleman laboring under an attack of gout.

The case which follows not only shows that the symptoms of an emotional disorder, functional in character, may so closely resemble one involving organic disease, that two distinguished surgeons may confound them (and it may be added that what happened “many years ago” may happen now, if not with experienced hospital surgeons, with general practitioners);¹ but it also presents a good example of the cure of a hysterical affection of the joint by an exclusively psychical remedy.

“Many years ago,” says Mr. Skey, “when I was less familiar with hysteric affections, I attended the case of a young lady of nineteen (suffering from a painful affection of the knee) in con-

¹ Brodie confesses he had often made the mistake himself.

junction with Mr. Stanley. We both deemed the disease to belong to the class of inflammation, and conjointly adopted the usual remedies so indiscriminately resorted to in all painful affections of the joints. Many weeks elapsed without improvement, and I remember that we discussed with some anxiety the probable issue in abscess, destruction of ligaments, absorption of cartilage, and ultimate amputation of the limb! One day my patient informed me that her sister was going to be married, and that, cost what it might, she had made up her mind to attend the wedding. At this proposal I shuddered. Having expatiated to no purpose on the probable consequences of so rash an act, with all the force of language I could command, I determined to give stability to the joint for the occasion, and I strapped it up firmly with adhesive plaster. On the following day I visited her. She told me she had stood throughout the whole ceremony, had joined the party at the breakfast, and had returned home without pain or discomfort in the joint. Within a week her recovery may be said to have been complete" (xlv., September 22, 1866).

Stirring political events, demanding individual action, have a wonderful influence over nervous affections. This fact was exhibited in the first American war. Dr. Rush, after stating that many whose habits were infirm and delicate, were restored to perfect health by the change of place or occupation to which the war exposed them, adds: "This was the case in a more especial manner with hysterical women, who were much interested in the successful issue of the contest. The same effects of a civil war upon the hysteria were observed by Dr. Cullen in Scotland in 1745-6. It may, perhaps, help to extend our ideas of the influence of the passions upon diseases, to add that when either love, jealousy, grief, or even devotion, wholly engrosses the female mind, it seldom fails, in like manner, to cure or to suspend hysterical complaints" (lxi., i. p. 132).

Every one has heard the story of the doctor who left his prescription on the table for a lady who suffered from pleurodynia, saying, "Put this to your side," and how the patient literally did so, instead of obtaining the prescribed plaster, but, in spite of this mistake, derived great benefit from the application.

A parallel case of colic is mentioned by Dr. John Brown, of Edinburgh. He ordered a laboring man some medicine, and giving him the prescription, said, "Take *that*, and come back in

a fortnight, and you will be well." As he returned at that time hearty and well, free from the colic and sinking at the stomach, of which he had complained, and with a clean tongue and cool hand and a happy face, Dr. B. was very proud of the wonders his prescription had effected, and said, "Let me see what I gave you." "Oh," said he, "I took it." "Yes," said the doctor, "but the prescription?" "I took *it*, as you bade me. I swallowed it;" that is, the paper itself! But the story is somewhat spoiled for our present purpose by the patient, who was accustomed to relieve his troubles by whiskey, having been ordered to discontinue it, and live on broth and milk instead! So that the Imagination was, after all, the least important of the remedies.

Section II.—Influence of Mental States upon Disorders involving Excessive or Defective Action of the Voluntary Muscles.

This division, like the corresponding one in previous chapters, is, of course, open to the objection that it is based on a mere symptom, and that it would be more correct to take the nervous system as our guide. It will, however, sufficiently serve our present purpose.

EPILEPSY.—Sweetser cites from the *Medical and Surgical Journal*, vol. xviii., the case of a lady in the prime of life, of robust health, who was for four years afflicted with epilepsy in a violent degree, the paroxysms returning three or four times a week, continuing for some hours, and leaving the patient in a state of stupor. A variety of medicines had been tried in vain, and the case was considered hopeless, when, on receiving a dreadful mental shock, by the circumstance of her daughter being accidentally burnt to death, the disease entirely and finally left her" (xliii. p. 28).

The old French Commission on Magnetism found, as I have already stated, that they could produce convulsions by acting upon the Imagination. But more than this, they found they could by the same talisman terminate them. "To prove incontestably, and to complete the picture of the effects of the Imagination, powerful alike to agitate and to calm, we have" say they, "put an end to a convulsion by the same charm which produced it, the power of the Imagination."

In like manner, in the case of the poor hystero-epileptic girl treated by Madame de St. Amour, "*Levez-vous,*" said the latter, "*vous êtes guérie,*" and the fit subsided.

In the *Annales Medico-Psychologiques*, for 1846, is the report of a case of epilepsy from which the following is condensed: Marie-Anne Saveret, Auxerre, was very much frightened when about fourteen years of age, in consequence of which she lost her consciousness and was convulsed. In the evening she had another attack. This alarm occurred when she was subject to headache, irritability, indefinite pains, and other symptoms which indicated a critical period of life.

She had no return of these convulsive attacks until she was twenty-two years of age, when the catamenia appeared. The seizures are described by Dr. Girard as epileptic, and as followed by momentary incoherence. Soon after maniacal attacks occurred, and became so severe that it was found necessary to place her in an asylum. For about three years she remained there, having become one of the most violent and dangerous patients under Dr. Girard's care, in spite of moral and medical treatment in a variety of forms. She escaped at length from the establishment, and for three months remained at large. Here a new moral force came into action; to escape detection she exerted all the self-control at her command, and became calm and inoffensive. Though she does not appear to have entirely recovered, she remained free from epileptic attacks, coherent, and her habits were industrious and regular. In reporting this case, Dr. Girard observes that if he were asked how a moral influence which provoked the attacks of epilepsy, can in a milder form (Fear), benefit, or even cure, so serious a malady, he should, in reply, demand an explanation of the cure of an ague by acting powerfully upon the Imagination. As he remarks, epilepsy and intermittent fever both belong to the *neuroses*, and it is not astonishing that they alike respond to the same psychical influences.

PERTUSSIS.—Fear used to be a popular remedy in this disorder, the noise and alarming appearance of a mill-hopper having been employed to frighten a child placed in the corn-bin. In *Fraser's Magazine*, May, 1873, is recorded a case of whooping-cough which was cured by a good thrashing.

HYSTERICAL CONTRACTION.—Every practitioner is familiar with hysterical contraction of the fingers. A young woman's fingers

are firmly flexed upon the palm, and obstinately resist any attempt to extend them. All the orthodox pharmaceutical means may be employed and fail, even if, its true nature being recognized, it is not confounded with the effects of inflammation of the tendons or their thecæ, or of organic cerebral disease; and yet a cure may be performed in a few minutes by what is ordinarily understood by the Imagination, by a sudden thrill of Hope or Faith which masters the tonic spasm, and sets the fingers free. Dr. Bertrand knew a woman whose hand, for thirty-eight years, had been closed as firmly as the fist of a boxer, and could only be opened by very considerable force; yet her hand, to his knowledge, opened in response to the appeal of Madame de St. Amour. Whether it relapsed eventually into its former condition is not stated, but for three days, at least, it remained relaxed and as serviceable as the other. It is in regard to such cases (whether hysterical, or the remains of old disease) that Burton's pithy observation is but too true: "An empirick oftentimes, or a silly chirurgeon, doth more strange cures than a rational physician. Nymannus gives a reason—because the patient puts his confidence in him, which Avicenna prefers before art, precepts, and all remedies whatsoever. 'Tis opinion alone (saith Cardan) that makes or mars physicians; and he doth the best cures, according to Hippocrates, in whom most trust."

Mr. Kingdon's case, reported to the Medical Society of London, of an old man, the subject of *paralysis agitans*, who was strikingly influenced by emotional excitement, is referred to by Dr. Moore, in his *Power of the Soul Over the Body*, p. 310. He "had been long unable to walk. The child of a friend was admitted to see him, and so greatly delighted was he that he arose, walked across the room, filled a paper with small shells, gave it to the child, and then sat down as paralytic as before."

PARALYSIS.—Some years ago an intelligent sailor, whom I know, was left, among others, on one of the desolate Crozet Islands, in the Southern Ocean, and suffered greatly in consequence. A portion of the crew he describes as "seized with a strange sort of sickness, for they were all drawn up like cripples, some in a sitting posture with their heads resting on their knees, but in no pain, unless you went to move them, or they tried to exercise themselves to regain the use of their limbs." At last, a ship unexpectedly came in sight, and the sailors made large fires

as signals of distress. "The sick men," he says, "got half well at the sight of a fine ship, some even beginning to crawl about on all-fours, and gathering up anything that would burn, to keep the fires going."

It is, however, to definite cases of paralysis that we now wish to refer. Probably, in the above instance, the men suffered from scurvy.

Dr. Bouchut states that in 1849 a little girl, Louise Parguin, whom excessive Fear had rendered dumb, and paralytic in all her limbs, was brought to him. "For two months everything had been done by the physicians, but to no purpose. In despair her father came with his child to Paris. The girl, who had heard of the great city, its great physicians, and the Hotel Dieu, spoken of only in the most extravagant way, arrived full of faith to be cured. In the evening I saw her dumb and paralytic; and, displeased at finding such a patient in the hospital, made no prescription. She was in the same state the next morning; I put off all treatment during the day. During the day she began to speak, the day after to move her limbs, and on the third day she walked about the wards completely cured. Her faith had served her" (lxviii., Jan. 1865).

Dr. Abercrombie relates the following: "A woman, mentioned by Diemerbroeck, who had been many years paralytic, recovered the use of her limbs when she was very much terrified during a thunder-storm, and was making violent efforts to escape from a chamber in which she had been left alone. A man affected in the same manner, recovered as suddenly when his house was on fire; and another who had been ill for six years, recovered the use of his paralytic limbs during a violent paroxysm of anger" (xxviii. p. 399).

Sir Humphrey Davy's well-known case of cure of paralysis was due to aroused hope and expectation. He placed a thermometer under the tongue, simply to ascertain the temperature. As the patient at once experienced some relief, the treatment was continued for a fortnight, when it ceased to be required, for the patient was well. This case is of interest from the application not having been made to the part affected; local excitement was not an element in the treatment; and the Attention was directed rather from than to the paralyzed limb.

Dr. Paris relates the circumstance in the following words:

"Early in life he was assisting Dr. Beddoes in his experiments on the inhalation of nitrous oxide. Dr. Beddoes having inferred that the oxide must be a specific for palsy, a patient was selected for trial, and placed under the care of Davy. Previously to administering the gas, Davy inserted a small thermometer under the tongue of the patient, to ascertain the temperature. The paralytic man, wholly ignorant of the process to which he was to submit, but deeply impressed by Dr. Beddoes with the certainty of its success, no sooner felt the thermometer between his teeth than he concluded the talisman was in operation, and, in a burst of enthusiasm, declared that he already experienced the effects of its benign influence throughout his whole body. The opportunity was too tempting to be lost. Davy did nothing more, but desired his patient to return on the following day. The same ceremony was repeated; the same result followed; and at the end of a fortnight he was dismissed cured, no remedy of any kind except the thermometer having ever been used" (*Life of Davy*, p. 74).

The following and the last of these illustrations has done duty so many times that we are tempted to omit it, but we insert it for a reason which has determined the same course in many other similar instances—the convenience to the reader of being able to put his hand upon the cases which he may be in quest of, bearing upon the same subject.

Herodotus relates that "during the storming of Sardis, a Persian meeting Cræsus was, through ignorance of his person, about to kill him. The king, overwhelmed by this calamity, took no care to avoid the blow or escape death; but his dumb son, when he saw the violent designs of the Persian, overcome with astonishment and terror, exclaimed aloud, 'Oh, man, do not kill Cræsus!' This was the first time (?) he had ever articulated; but he retained the faculty of speech from this event as long as he lived" (xliii. p. 27). Sweetser quotes from Van Swieten a case of hemiplegia of some years' standing, in a man, who was cured by sudden Terror.

Dr. Mackey¹ has adduced the cases of healing at Lourdes, near Pau, as inexplicable by any other hypothesis than that of a miracle, and bases his conclusion upon the records contained in the *Annales de Notre Dame de Lourdes* upon the authority of M. Lasserre, "a man of known honor and position," the narratives

¹ Dublin Review, 1880, p. 386, "Miracles and Medical Science."

being substantiated by names, dates, and places. Dr. Mackey, however, candidly admits that some cases may be paralleled in medical practice without question of the supernatural, and he justly likens some of the affections under which the devotees labored to those under the care of M. Charcot at the Salpêtrière, cases of loss of sensation and of motor power, well known to the readers of the Professor's *Lectures on Diseases of the Nervous System*. In one case, contracture of the right lower extremity of four years' duration, entirely disappeared the day after M. Charcot had given the patient a stern admonition on account of misconduct, and threatened to turn her out of the hospital (op. cit., translated by Dr. Sigerson, p. 291). In another, with contracture of a limb of two years' standing, she was charged with theft, and the malady suddenly vanished under the influence of the moral shock (op. cit.). In a third, hemiplegia, which had lasted eighteen months, disappeared "almost suddenly" after a disappointment.

The following are three cases at Lourdes which we give by way of comparison :

(1) "Mademoiselle C. E—, in 1864, after exposure, got violent pain in back, altered sensation, paralysis of lower extremities, and was afterwards generally paralyzed. Admitted to hospital in 1869 as a case of 'chronic myelitis,' she was transferred to the incurables in 1870; Barèges was fairly tried, but in 1873, the malady having progressed, she yet began to entertain fervent hope and confidence in our Lady of Lourdes. Carried there '*presque mourante, ou plutôt déjà cadavré*,' no sooner did her feet touch the water than she felt life return and pass to all the limbs; she felt no pain, and threw herself on her knees in the bath. She says, 'I felt the presence of the Virgin; I felt her touch me; I felt her round me.' The legs previously wasted were found well developed and strong! The patient returned home well, and has remained so for five years" (*Annales*, Feb. 28, 1879).

(2) "M. C. P—, æt. 14, 'vive et impressionable. . . Très peureuse à la suite d'une grande frayeur.' After a fall downstairs she then remained some time in bed and could not stand. M. Labbé certified her as paraplegic. This was complicated with frequent attacks of epilepsy; the limbs were like dead, and could not feel needles inserted. For treatment she had bromides, electricity, and, at St. Louis, baths, phosphate of lime, and externally the actual cautery. After one violent attack the right

arm became paralyzed, but this got well at the close of a novena. Carried to the grotto; as she lay before it she was taken with three shivers; 'the second made her rise, the third obliged her to run towards the shrine; at first she staggered, then walked firmly, and took to tending the sick'" (*Annales de Lourdes*, January 30, 1879).

Another case, and in this instance, a man:

(3) "In 1851 M. l'Abbé de M— lost his voice, in 1853 lost power in his knees, but both voice and power returned suddenly in 1855 whilst praying. The weakness of legs returned later, and then came impairment of sight, so that his studies were interrupted. In 1867 he became unable to say Mass, he could not walk or stand, his voice could scarcely be heard, and he could not see to read. He was rich, and all forms of balneo-therapeutic treatment were essayed under eminent men. At Lourdes, in 1873, M. l'Abbé Peyramale communicated to him his ardent confidence; a cure of paralysis occurred before his eyes; and one morning, while hearing Mass, pressed by an inward powerful feeling, he rose up, knelt, then walked, and preached *à haute voix* to the multitude" (op. cit., March 30, 1874).

The above case was regarded by Dr. Vidart as one of rheumatic affection of the spinal cord.

I the more readily cite these cases as examples of the influence of the Mind upon the Body, inasmuch as Dr. Mackey, a member of the Roman Catholic Church, admits them to be such, and controverts the dicta of Père Bonniot that we ought to recognize the intervention of a cause superior to nature, when the cure is *instantaneous*, and that the cures effected by the Imagination are *infinitely* rare, and its power *excessively* limited.

But there are other cases which, in this writer's opinion, cannot be so explained, such as the instant union of an old fracture of the tibia, the reduction of a dislocation of the hip, and the sudden cure of varicose veins of the leg of thirty years' duration, by the waters of Lourdes, and he truly says, "such cases cannot cure themselves, and no amount of faith and hope that the mind of man can imagine will unite a broken bone, reduce a dislocation, or obliterate a varicose vein." We shall certainly not attempt to apply our principles here, but content ourselves with Virchow's brief explanation of other remarkable phenomena, "*supercherie ou miracle*," and abandon every case to which a

parallel does not occur in the secular practice of scientific observation such as that conducted at the Salpêtrière.

In the *Nineteenth Century*, November, 1882, Mr. Richard F. Clarke, S. J., applies himself to the question, "Are the miracles of Lourdes worthy of credit?" Happily the writer maintains that no one ought to be condemned as a heretic, if he ventures to call these alleged miracles "a pack of rubbish." He queries, however, whether a man can do so "without refusing to accept evidence so clear, so well established, so multiplied, so various, so conclusive of the point at issue, as to write himself down a fool if he declares the witnesses to be either dupes or impostors, and the facts they narrate either a lie or a delusion." He then proceeds to adduce three "best cases" which have happened within the last two years. He holds that "it is absolutely impossible that imagination could have brought them about, as in each case there was some organic lesion, or else some clearly marked physical malady, affecting and destroying the bodily tissues, and almost incurable, even after long years, by any human means."

As we hold with Huxley that it is unphilosophical to deny alleged facts simply on the ground of their occurrence being "impossible," it is with us a simple question of evidence, but we are met on the threshold of the inquiry with the difficulty of obtaining such evidence as alone can be admitted in cases where the results are opposed to our ordinary experience. Thus, in the first case adduced, that of Mdle Phillippe, who was attacked with left-sided paralysis in 1877, and had two "cancerous swellings" in her throat in the following year, which were removed by operation. We have hardly accepted the fact of cancer, when we learn incidentally from a physician at Montpellier that it was "probably scrofulous." Such looseness of statement justifies one in hesitating to accept the alleged facts in an unqualified manner. It is true, however, that some of these recent "cures" are quite consistent with recovery under the influence of the imagination and emotion.

The wounds are said to have been healed instantaneously, but the proof of this is far from satisfactory; her medical man at any rate was not present, and so far as his evidence goes, the length of time may have been much longer.

In most instances, the true explanation is to be found—putting cases of downright imposture aside—in the double solution of

"false facts" and the true influence of the Mind upon the Body. I do not, however, press these occurrences into my service as proofs of the latter, though to the extent indicated I believe them to be illustrations. As I call in question the accuracy of certain alleged facts on the ground that more evidence is required to substantiate that which is *primâ facie* highly improbable, it is certainly open to those who disbelieve not only in miracles but in the influence of the imagination as being so powerful, to doubt the facts to a still greater extent, and dispute their trustworthiness for even the humbler purpose to which I think they may be devoted. All I can say is that the proof of the influence of the Mind upon the Body rests upon far stronger evidence than that derived from the alleged miraculous cures of Lourdes or Knock; and that we are more than justified in applying such evidence to the elucidation of any case which appears to be fairly analogous.

In the case of Mdle Phillippe, the paralysis may have been, and we do not doubt it was, purely hysterical, and the return of power under the mental influence to which she was subjected was in accordance with the experience of every physician familiar with this disorder. No attempt is made to prove that it was not hysterical, and the burden of proof clearly lies with those who desire to prove that her recovery was not the effect of psychical excitement.

In the second case, Mdme André was attacked in 1879 with left-sided paralysis, and amblyopia, and deafness on the same side, and was relieved by her pilgrimage to Lourdes, crying out all at once when in front of the grotto, "Sister Pauline, my fingers are moving!" In this instance there is absolutely no evidence of anything more than the hysterical hemi-anæsthesia so familiar to those who have visited the wards of the Salpêtrière. The holy water had certainly nothing to do with the cure, for she was not plunged in the sacred spring, the profound impression produced upon her by the grotto and its associations being sufficient to produce the desired effect.

The last case is one of white tumor of the knee complicated with fistulous ulcers, ankylosis, and curvature of the leg. On the 13th of August he went to Lourdes; on the 3d of September he walked without the aid of crutches, which before were indispensable. In this instance then, it is not pretended that the cure was sudden. One is tempted to say *mutatis mutandis*, what Mr. Clarke says of the cure, in the first instance, of Mdme André's arm.

"But if the arm is healed, why not the leg also?" "But if a limb is miraculously cured at all, why is it not cured at once?" Besides we know nothing of M. Leys, whose medical certificate is adduced in proof that he had attended the patient for the swelled knee. Could not the proprietor of the vaunted remedy, advertised as a "miraculous cure for corns," produce as reliable a witness?¹

In the *Life and Letters* of an excellent man, the late Rev. Frederick Wilfred Faber (Letter xciii.), we read the following, which could easily be paralleled by similar cases of relief from sick headache, by very mundane causes.

"I hardly know where to begin. Some time ago, a lady at prayer in our church, thought it was revealed to her that St. Mary Magdalene of Pazzi wished to confer some *grazia* on me in connection with my headache. Her director gave her permission to act upon this, whereupon she wrote to me, begging me, when my headache came on, to apply a relic of the Saint to my forehead. Some days elapsed. I asked Father Francis, my director, for his leave to do this; as it was a merely temporal thing, he took some time to consider. I became ill and had a night of great pain. I thought he had forgotten all about it, and that it would be a blameworthy imperfection in me to remind him of it. The morning after, he came to confession and found me ill in bed; he was going away but I knew he was going to say mass, and so I made him kneel down by my bedside, while I put on my stole, and with considerable pain heard his confession; when he rose I gave him the stole and asked him to hear my confession, which he did. Afterwards he said, 'Well now, I think it would be well to try this relic.' I answered, 'Just as you please.' I was in great suffering, and very sick besides. He gave it to me and walked away to the door to say mass. I applied the relic, a piece of her linen, to my forehead. A sort of fire went into my head, through every limb down to my feet, causing me to tremble; before Father Francis could even reach the door, I sprang up, crying, 'I am cured, I am quite well!' He said I looked 'as white as a sheet.' I was filled with a kind of sacred fear, and an intense desire to consecrate myself utterly to God. I got up and

¹ The reader is referred to the new edition of Dr. Wilks's *Diseases of the Nervous System* (1883), for an important reference to a case, formerly under Dr. Wilks's care at Guy's Hospital, alleged to have been cured at Lourdes.

dressed, without any difficulty, or pain, or sickness. This was on the Wednesday. On the Saturday I had another headache, but I had not asked Father Francis's leave about the relic, and felt I ought to take no steps to get rid of my cross. In the afternoon he told me I might apply it. Fathers Philip and Edward were in the room. I was on my bed, I took the relic and applied it; there was the same fire in a less degree, but no cure. I then said to the Saint, 'I only ask it to go to the Novena and Benediction.' The cure was instantaneous, while Father Philip had such an impression that the Saint was in the room, that he was irresistibly drawn to bow to her. Well, I said all my office, then in an hour or so came the Novena and Benediction, and as soon as I returned to my room I was taken so ill again I was obliged to go to bed. Meanwhile I had totally forgotten what the others reminded me of afterwards, that two years ago Michael Watts Russell wrote to me from Florence, and said: 'The children send their love and desire me to say they have just come from the Tomb of St. Mary Magdalene of Pazzi, whom they have been asking to cure Father Wilfred's headache.'"

Nearer home than Lourdes have there been manifestations of an extraordinary character followed by alleged miraculous cures which call for some notice here. In the summer of 1879, an apparition of the Virgin was seen at Knock, near Claremorris, in the West of Ireland, and this place subsequently became the resort of numberless pilgrims in quest of health, who found in the whitewash or cement of the walls of the church where the vision was seen, the means of rapidly removing various disorders, as paralysis, rheumatism, sciatica, and heart disease. The effect was heightened and sustained by the repetition of the miraculous appearances from time to time. The correspondent of the *Cork Examiner* (Sept. 17, 1881) in describing his visit to Knock, writes: "We had heard so much of the cures accomplished at this shrine, that to hear of them from the true source, from the Curé himself, was the resolve we had made, and to his lowly residence we turned our steps; we found him seated at a table, reading his office by the light of a small lamp. He told of several cures, some of which we subjoin. He has received in the case of one cure, three medical certificates. W. J. Holland was suffering from curvature of the spine, and had to wear a plaster jacket; he was cured when he came to Knock, and soon after threw off his

jacket, which weighed fifteen pounds, and walked twenty miles. George Crallene was cured of hip disease, and after his cure, entered the Diocesan College of his county, and is now on his way to Rome to complete his studies for the priesthood. Father Kavanagh has seen the figure of the Blessed Virgin on two or three occasions; he has heard her speak, and frequently has seen the most brilliant radiances surpassing anything in nature, resplendent and dazzling, whiter than fuller's earth. Together with these wonderful appearances, is the cure of the tumor of the niece of the present Bishop of Limerick, which was pronounced incurable by a most eminent physician. She made a Novena to our Lady of Knock, using the cement sent to her by a friend. It is no exaggeration to say that hundreds have been cured in visiting Knock, and hundreds have been cured who could not take the journey, by using the cement and invoking the pity of the Mother of God."

Dr. John Campbell Quinn, of Belfast, writes respecting a girl of sixteen, hardly able to walk, suffering from scrofulous abscesses around the hip-joint, which had been discharging for some years. She went to Knock. Three weeks after her return when seen by the doctor "the change in her condition was surprising. She had become healthy and pleasant looking, with red lips and full pulse, and the discharge had stopped. I have seen her three or four times since, and each time her condition is better; only the cicatrices remain. To-day (Aug. 3, 1880) I pronounce her well and fit for work. I am forced to the conclusion, though sceptical about miracles, that the all-powerful intercession of the Blessed Virgin has operated upon Elizabeth Duffy in a wondrous cure, while at Knock." It is unfortunate that the wounds had not been probed by Dr. Quinn, so that although he regarded the case as one of necrosis, proof is wanting. Nothing would be gained for our present purpose by multiplying these alleged cures; we know too little of the witnesses, patients, and the diseases under which they labored to render it possible to make a scientific use of them. No doubt, however, many received benefit from visiting Knock, and left there sticks and crutches which they no longer needed, but this is only the old story of curing disease by powerfully stimulating the recuperative powers of the system by emotional excitement, and it would be necessary to know the exact nature of the complaint on competent authority before deciding that in

any particular instance the principles applicable to apparently parallel instances do not sufficiently explain its removal by the cement cure.

It is of interest to note the most recent reports of this singular modern phase of so-called miraculous healing in Ireland. The correspondent of *The Daily News*, who visited the spot in February, 1880, and in 1881, writes to the same paper in August, 1883, that on his arrival at Claremorris he found no difficulty in obtaining a car to drive him to Knock at a very moderate fare, although the number of cars is not one-third of what they were when the excitement was at its height. That the attractions of Knock are no longer what they were three or four years ago admits, the correspondent says, of no question. His description of what he saw and heard is, however, worth transcribing.

"It was near six o'clock in the evening, when I reached what used to be called the little Chapel of Knock, but what is now rather an extensive edifice, capable of seating, if there were seats, probably about six hundred or seven hundred persons. At my last visit alterations were in progress, the entire extent of which was not then indicated. Not only has the outside of the chapel been replastered—care being taken to guard by a railing the plaster of the wall on which the original apparition was said to have appeared, and the old plaster of which had been removed by the pilgrims—but the nave of the chapel has been enlarged to nearly three times its former size by the throwing down of the side walls and rebuilding them flush with the gables of the transept; handsome pillars springing from the site of the old walls support the roof; the ceiling is now of polished oak, the walls are newly painted, and a handsome wooden floor has taken the place of the cold earthen one, on which, in the earlier period of the rush to Knock, the visitors had to kneel while engaged in their devotions—many of them so spending the whole night in the chapel. The rude altar, similar to those in the chapels in many remote districts in Ireland, has given place to one which for its artistic design and its admirable execution, is surpassed by few of the altars even in the Roman Catholic cathedrals.

"There were only two or three people to be seen in the chapel yard at the time of my arrival. These were women of the peasant class, who knelt on the ground in front of the image of the Virgin, which has been erected within the railing already

referred to. The number of crutches and sticks, all presumably discarded by people who have been cured, has largely increased since my last visit. The more remarkable of these, about one hundred and fifty in number, are hung in three rows along the wall, on which the first apparition was reported to have been seen. They include crutches of all forms and of all lengths, boots for deformed feet, and all the various iron and other appliances that are used to assist lame people in walking. The crutches have all been dipped in a solution of lime, so as to give them the same color as the newly plastered wall upon which they are hung. From an artistic point of view this is a great improvement, but it seems to detract from the realism which the crutches in their original state imparted. In addition to these there are two receptacles in the chapel yard filled chiefly with walking-sticks, at least a thousand in number, for which the owners doubtless persuaded themselves they no longer had any use. It may be remembered that not only was great virtue attributed to the mortar taken from the chapel walls, but that the miraculous properties of the rainfall from the roof of the chapel were loudly extolled, while a mixture of both was considered the most curative agency of all. The mortar is no longer available, the exterior coating of the walls being now of a much harder material than the loose, rough coating which formerly covered them; and, as I have said, the wall which suffered most is now enclosed. The water, however, is still available, and two capacious tanks have been erected (one at each side of the Sacristy) in which the water is stored, and is doubtless as eagerly sought after by many, as it was in the winter of 1879. I had been somewhat disappointed at the very small number of people outside the chapel, remembering the crowd I had seen there on my first visit, and the smaller, but still considerable number I had seen on my second visit. Passing round to the front and entering the building, the great change in its internal aspect, caused by the improvements I have already mentioned struck me at once. What might be regarded as little better than a barn had been transformed into a comparatively handsome edifice, not so much out of proportion as might have been expected from the extensive alterations which it had undergone. There were about thirty people kneeling in front of the altar—one man reading prayers aloud, while the others responded audibly and fervently. They

were about equally composed of men and women, with two or three children, the larger number, both of men and women, being of the peasant class, while the remainder were obviously in a better position in life.

"Some were cripples, and had their crutches with them; others were clearly in ill-health from some cause or other; but not a few, two or three of the better dressed women especially, seemed the picture of health and strength. Some of the visitors are from distant climes—from the United States, from Africa, and from Australia. One girl, a present visitor, who had come, or rather been brought, from South Africa by her mother, with a view to being cured of lameness, threw her crutches away after her first visit to the chapel, where, she relates, she had a vision of the Blessed Virgin. The sequel is rather disappointing. The poor girl—she is fourteen or fifteen years of age—does not appear to have obtained much physical benefit, notwithstanding her heroic effort to dispense with her crutches. She suffers great pain in walking, probably as great as she would have done had she tried the experiment of walking without crutches before coming up to Knock—and, said my informant, she is daily becoming worse in her general health. The only persons I entered into conversation with were sympathizers; and although they generally said that cures were being effected, the statements they made were invariably of that indefinite kind that it was impossible to get at the facts of anything like a real case. Apparitions too were still seen occasionally; the Virgin by some, stars by others. The night before my arrival I was informed an apparition of the Virgin had been witnessed. The statement, it appeared, was vouched for principally by a Mrs. Mullin, from Francis Street, Dublin, and some members of her family, who are what may be called permanent residents of Knock, and who having come here at an early period have remained, and now earn their living by the sale of articles of devotion in one of the tents, or rather wooden huts, devoted to that purpose, which have been erected in the chapel yard, about one-half of which, it may here be stated, are now closed, presumably because of the slackness of trade. 'Some also,' said my informant, 'saw stars, but,' she continued, 'others who were present could not see either the one or the other. I could not,' she added, 'but perhaps it was because I am not good enough; I can't tell.'"

The resemblance of the phenomena here described to those occurring in other epidemics of emotional healing is striking, and does not increase the disposition to place the "Knock miracles" on a higher level than that to which the history of the triumphs of the imagination in its influence upon the body would lead us to refer them.

There is a very interesting passage in an old author recognizing in the clearest manner and far in advance of his age the rôle of the imagination in the cures attributed to the sacred charm of relics. The writer is Pierre Pomponazzi, of Mantua, who flourished in the sixteenth century. After remarking "one can easily conceive the marvellous effects which confidence and the imagination can produce, especially when they exist both in the operator and the persons operated upon," he continues, "the cures attributed to certain relics are the result of this confident imagination. Imposters and philosophers alike know that if any other skeleton were substituted for the bones of a saint, the patients would not the less be restored to health, as they *believe* they approached the true relics." (*Annales Medico-psychologiques*, p. 632, 1860.) Alas, for the slow advance of correct ideas on the subtle and marvellous power of the imagination since the days of Pomponazzi!

Section III.—Influence of Mental States upon Disorders involving the Involuntary Muscles and the Organic Functions.

We have already seen the influence of the Imagination, etc., upon the involuntary muscles (especially the muscular fibre of the intestinal canal), and will only add here three cases; two showing the action of mental states on constipation, and the other on asthma—probably spasmodic. In the illustrations given, however, of other diseases, this action on the muscular coat of the vessels is, to a large extent, exemplified.

CONSTIPATION.—In the *Bibliothèque choisie de Médecine*, tome vi. p. 84, is a good example of the effect produced by the Imagination, during sleep, upon the action of the intestines. The daughter of the Hanoverian Consul, aged eighteen, having to take a rhubarb purge on the following day, which she especially disliked, dreamed that she had taken the hated dose. Gripped by her imaginary rhubarb, she awoke, and the bowels acted freely five or six times.

Precisely similar is a case which I give on the same authority (Demangeon); that of a monk for whom some purgative had been prepared, to be taken on the following day. He dreamed that he swallowed the medicine, the consequence of which was that he was aroused by the necessity of attending to the calls of nature, and was copiously purged eight times (lx. p. 149). All must admit that any medical man who would engage to ensure the same operations from imaginary as from real rhubarb or senna, would enjoy a fashionable purgative practice.

ASTHMA.—Dr. Moore gives the following: "An officer in the Indian army was confined to his bed by asthma, and could only breathe in an erect posture; but a party of Mahrattas broke into the camp, and fearing certain death, he sprang out with amazing activity, mounted his horse, and used his sword with great execution, although the day before he could not draw it from its scabbard" (xxxviii. p. 309).

WARTS.—The influence of the Imagination upon warts, trivial as it seems, is really a curious page in the history of this power as a curative agent. They are so apparent that there cannot be much room for mistake as to whether they have or have not disappeared, and in some instances within my own knowledge, their disappearance was in such close connection with the physical treatment adopted that I could hardly suppose the cure was only *post hoc*. In one case, a relative of mine had a troublesome wart on the hand, for which I made use of the usual local remedies, but without effect. After they were discontinued, it remained *in statu quo* for some time, when a gentleman "charmed" it away in a few days. A surgeon informs me that some years ago his daughter had about a dozen warts on her hands. They had been there about eighteen months, and her father had applied caustic and other remedies without success. One day a gentleman called, and in shaking hands with Miss C—, remarked upon her disfigured hand. He asked her how many she had; she replied she did not know, but thought about a dozen. "Count them, will you?" said the caller, and taking out a piece of paper he solemnly took down her counting, remarking, "You will not be troubled with your warts after next Sunday." Now, it is a fact that by the day named the warts had disappeared and did not return.

Brand (op. cit.) points out that warts were cured by magic in Lucian's time; and he refers to a time-honored cure for warts,

that of stealing a piece of meat from a butcher's shop, rubbing your warts with it, then throwing it away or burying it. As the beef rots the warts decay. I dare say that the excitement of the theft was one element in the cure.

In visiting a County Asylum some years ago, my attention was directed to several of the patients and nurses who were pestered with warts, and I solemnly charmed them away within a specified period. I had quite forgotten the circumstance until, on revisiting the institution a few months afterwards, I found that my practice had been followed by the desired effect, and that I was regarded as a real benefactor.

As Dr. Carpenter says, therefore, "the charming away of warts by spells of the most vulgar kind" belong to those "cases which are *real facts*, however they may be explained" (viii. p. 984).

Lord Bacon, in his *Natural History*, does not fail to refer to the curing of warts by charms, and adduces his own experience, but does not see through the charm the effects of the Imagination. "I had from my childhood," he says, "a wart upon one of my fingers; afterwards, when I was about sixteen years old, being then at Paris, there grew upon both my hands a number of warts, at the least a hundred, in a month's space. The English Ambassador's lady, who was a woman far from superstition, told me one day she would help me away with my warts; whereupon she got a piece of lard with the skin on, and rubbed the warts all over with the fat side; and amongst the rest, that wart which I had from my childhood; then she nailed the piece of lard, with the fat towards the sun, upon a post of her chamber window, which was to the south. The success was that within five weeks' space all the warts went away, and that wart which I had so long endured for company. But at the rest I did little marvel, because they came in a short time, and might go away in a short time again; but the going away of that which had stayed so long doth yet stick with me" (xiv., ii. p. 73).

Bacon attributes this result, not to the expectant action of the mind upon the warts, but to the sympathy supposed to exist between the lard and the warts after they had once been in contact. The lard having touched the warts, the melting or wasting away of the former in the sun, caused the disappearance of the latter. The exploding of this vulgar error is one of the triumphs of the inductive process of investigation which Bacon himself initiated.

"Even tumors," says Hunter, "have yielded to the stroke of a dead man's hand" (ii., I. p. 360). A curious illustration of this superstition is given in Brand's *Popular Antiquities* (vol. iii. p. 147), from a newspaper published in 1777. "After Dr. Dodd had hung about ten minutes, a very decently dressed young woman went up to the gallows, in order to have a *wen* on her face stroked by the doctor's hand; it being a received opinion among the vulgar that it is a certain cure for such a disorder. The executioner, having untied the doctor's hands, stroked the part affected several times therewith." Unfortunately, we are not told whether the application was successful.

SCURVY.—That nervous diseases are not alone influenced by the Imagination or Expectation, is well shown by the effect produced upon blood diseases. Scurvy, as has been often stated, was cured solely by this means at the siege of Breda, in 1625. The Prince of Orange, when the city was almost obliged to capitulate, sent word to the sufferers that they should soon be relieved, and provided them with medicines pronounced to be very efficacious in the cure of scurvy. "Three small phials of medicine were given to each physician, not enough for the recovery of two patients. It was publicly given out that three or four drops were sufficient to impart a healing virtue to a gallon of liquor." "We now displayed our wonder-working balsams," continues the narrator, Dr. Frederic Van der Mye, "nor were even the commanders let into the secret of the cheat put upon the soldiers. They flocked in crowds about us; every one soliciting that part might be reserved for their use. Cheerfulness again appears in every countenance, and a faith prevails in the sovereign virtues of the remedy. . . . The effect of the delusion was really astonishing; for many quickly and perfectly recovered. Such as had not moved their limbs for a month before, were seen walking the streets sound, upright, and in perfect health. They boasted of their cure by the Prince's remedy. . . . Many who declared that they had been rendered worse by all former remedies, recovered in a few days—to their inexpressible joy, and the no less general surprise—by taking (almost by their having brought to them) what we affirmed to be *their gracious Prince's cure*" (Dr. Lind, *On the Scurvy*, p. 352). Before this happy experiment was tried, they were, states Van der Mye (who was present), in a condition of absolute despair. "This, the terriblest circumstance of all,

gave rise to a variety of misery; hence proceeded fluxes, dropsies, and every species of distress (*omne chaos morborum*), attended with a great mortality."

It is stated on good authority that, in 1744, the prospect of a naval engagement between the British and Allied fleets, had the effect of checking the scurvy (lxi., i. p. 129).

Such a result of the Imagination as the above shows, as we have said, that its operation is not restricted to affections of the nervous system. John Hunter observes that, while we should naturally expect that diseases connected with the nerves—and those in which their alteration is in the action of parts, not in their structure—would be most affected by the Imagination, "we find that there are other diseases with which they appear to have little connection that are much affected by the state of the mind" (ii., ii. p. 360).

Gout.—"You may see a person with gout," says Abernethy in his *Lectures*, "who is almost unable to move with pain; but produce a shock on his nervous system by telling him that the house is on fire, and he will scamper about like a lamplighter. As Smollett tells us, in one of his novels, of Captain Lismahago, who went into a house and cried out to an old gentleman with the gout, 'Mad dog! mad dog!' when he jumped up and ran out of the house even into a pond of water opposite." In such examples, it is immaterial whether the terror arise from a real or an imaginary cause; the remarkable, though familiar fact is, that a strong mental image or impression infuses new power into the nervous and muscular system. The very fear which in a healthy person may produce excessive muscular contraction—a convulsion—will serve to nerve the limb of the crippled podagric just sufficiently to enable him to escape from danger. But were this all, we could not adduce this occurrence as an illustration of the cure of the gout; an obstacle to locomotion being temporarily overcome, but the disease remaining. In the second case, however, adduced in the following illustrations, an actual cure would appear to have been effected.

"A captain of a British ship of war," says Dr. Rush, "who had been confined for several weeks to his cabin by a severe fit of the gout in his feet, was suddenly cured by hearing the cry of 'Fire' on board his ship. This fact was communicated to me by a gentleman who was a witness of it. Many similar cases are

upon record in books of medicine. I shall in another place insert an account of one in which the cure effected by a fright *eradicated the disease from the system so completely as ever afterwards to prevent its return.*" Here is the case, communicated by Judge Rush, the doctor's brother :

"Peter Fether, the person cured, is now alive, a householder in Reading, seventy-three years of age, a native of Germany, and a very hearty man. The first fit of the gout he ever had was about the year 1773; and from that time till 1785 he had a regular attack in the spring of every year. His feet, hands, and elbows were much swollen and inflamed; the fits lasted long and were excruciating. In particular the last fit in 1785 was so severe as to induce an apprehension that it would inevitably carry him off, when he was suddenly relieved by the following accident. As he lay in a small back room adjoining the yard, it happened that one of his sons, in turning a wagon and horses, drove the tongue of the wagon with such force against the window, near which the old man lay stretched on a bed, as to beat in the sash of the window and to scatter the pieces of broken glass all about him. To such a degree was he alarmed by the noise and violence that he instantly leaped out of bed, forgot that he had ever used crutches, and eagerly inquired what was the matter. His wife, hearing the uproar, ran into the room, where, to her astonishment, she found her husband on his feet, bawling against the author of the mischief with the most passionate vehemence.

"From *that* moment he has been *entirely exempt from the gout*, has never had the slightest touch of it, and now enjoys perfect health, has a good appetite, and says he was never heartier in his life. . . . To you, who have been long accustomed to explore diseases, I leave the task of developing the principles on which this mysterious restoration from the lowest decrepitude and bodily wretchedness to a state of perfect health, has been accomplished. I well know that toothaches, headaches, hiccoughs, etc., are often removed by the sudden impression of Fear, and that they return again. But to see a debilitated, gouty frame instantly restored to vigor; to see the whole system in a moment, as it were, undergo a perfect and entire change, and the most inveterate and incurable disease *radically* expelled, is surely a different thing, and must be acknowledged a very singular and marvellous event. If an old man languishing under disease and infirmity had *died*

of mere fright, nobody would have been surprised at it; but that he should be absolutely cured, and his constitution renovated by it, is a most extraordinary fact, which, while I am compelled to believe by unexceptionable evidence, I am totally at a loss to account for" (lxi., ii. p. 180).

Probably no one will be disposed to question the genuineness of this case; but it is often easier to believe that a thing has happened than that it will happen again. I once called upon a physician whom I found powerless on the couch from an attack of gout. He said he "had been howling with pain for the last twenty-four hours." I ventured to tell him that I had no doubt he would be able to run down stairs into the street if the house were on fire, or a tiger from a menagerie in the neighborhood should enter the room. He at once replied that, although such an event might cure a *nervous* or *hysterical* disease, it would never cure *gout*. I mentioned several cases in point. He denied the facts, and asserted that no power on earth could possibly make *him* move. Unfortunately (for science), neither fire nor tiger tested the correctness of his opinion; but as he was out again in a couple of days, there is nothing improbable in the view that, by a mental shock, he might have been as suddenly cured as Peter Fether, whose case was chronic and much more severe.

PHTHISIS.—Terror has appeared to benefit even patients in consumption. According to Dr. Blane, a frightful hurricane in Barbadoes in 1780 had one salutary effect—that of benefiting some and curing others who labored under tubercular disease of the lungs. Of course in the absence of more detailed evidence, especially that obtained from the stethoscope, such a statement must not be taken for more than it is worth. Dr. Rush refers to the cases related by Van Swieten and Smollett of consumptive patients recovering their health from falling into cold water, and inclines to think that in both instances fright and consequent exertion produced a beneficial result—observing that this is only one of many proofs which might be brought forward, of partial or unequal action being suddenly changed into general and equal excitement throughout the system. The passions excited by war are regarded by him as explaining some of the cases of phthisis which are said to have occurred in camp life (lxi., ii. p. 83).

Tissot records the following: A man of letters reached an advanced stage of phthisis, when he consulted a physician. At this

period he happened to obtain fresh literary distinction, and was fortunate in other ways; the consequence being that he was greatly delighted. The physical effect was that his pulmonary affection was suspended, and remained stationary for a long time (xxxv., Sept. 1867, p. 167).

The same writer cites from Mead the case of a young woman, aged twenty-eight, who labored under all the symptoms of confirmed phthisis, and was threatened with death, when exaggerated fear about the state of her soul, began to torment her. Alarm, increased by the discourse and exhortations of friends, no doubt more pious than enlightened, threw her into a state of religious insanity. The consequence, as respects the bodily condition, was that the hectic fever, the expectoration, the sweats, the emaciation, and other unfavorable symptoms disappeared, and led to the hope of cure. But the form of the mental affection having changed to simple melancholy, the hectic returned, the pulmonary disease progressed, and the patient died in the last stage of consumption (*op. cit.*).

DROPSY.—Fear may be regarded as the digitalis of our *Remedia Psychica*. By influencing the tone of the vital powers it may act upon the circulation and the absorbents rapidly and effectually. Abernethy's case of the poor woman frightened by a bull, and relieved of her burden, will occur to the reader. Here the relief came through the kidneys. It has been supposed that the fear of death (as well as the fasting he adopted) served to relieve Dr. Johnson of twenty pints of fluid, as recorded by Sir John Hawkins.

Dr. John Pennington, of Edinburgh, records the following: "A sailor in an ascites, fell off the end of the yard into the sea; the weather being calm he was taken up unhurt, but to use the sailor's words, who told me the story, he was frightened half to death, and as soon as he was taken out of the water, he discharged a gallon of urine or more." Dr. Pennington observes, "the sedative operation of Fear, was, no doubt, the cause of the cure."

Dr. Rush refers to the case of a young woman (nineteen years of age), who had taken the usual remedies for ascites without any benefit. Dr. Hull was consulted and immediately proposed that the operation of tapping should be performed. "To this she objected, but so great was the fear of this operation, which the pro-

posals of it suddenly excited in her mind, that it brought on a plentiful discharge of urine, which in a few days perfectly removed her disease." Again, a lady with dropsy, in Philadelphia, was informed that tapping was necessary, and was much terrified upon hearing it. "I saw her two days afterwards, when she told me, with a smile on her countenance, that she hoped she should get well without tapping, for that she had discharged two quarts of water, in the course of the day after we had advised her to submit to that operation. For many days before she had not discharged more than two or three gills in twenty-four hours" (lxi., ii. p. 114). However, in this case the operation was subsequently performed. On the occasion of a second paracentesis, Fear again appeared to be the cause of a remarkable stimulation of the kidneys. Two similar cases fell under the observation of this physician. We have in a previous chapter (page 336) reported an interesting case of this kind, in order to illustrate the influence of emotional excitement on the organic functions. In this and several other instances, the illustrations which we gave for this purpose were necessarily examples also of the cure of disease.

INTERMITTENT FEVER.—A chapter might be written simply on the charms supposed to be of efficacy in ague. One remedy was wearing round the neck the mysterious word "Abracadabra," written in a peculiar manner. Chips from the gallows, placed in a bag and hung round the neck, or put on the skin, "will cure the ague, or prevent it," says Grose. The same result was expected from the halter of a criminal who had been executed.

In Brand's *Popular Antiquities* (vol. iii. p. 149) from which the above is taken, occurs the following: "Mr. Douce's MS. notes say, 'It is usual with many persons about Exeter who are affected with ague, to visit at dead of night the nearest cross road five different times, and there bury a new-laid egg. The visit is paid about an hour before the cold fit is expected; and they are persuaded that with the egg they shall bury the ague.' I shall here note another remedy against the ague mentioned as above, viz., by breaking a salted cake of bran, and giving it to a dog when the fit comes on, by which means they suppose the malady to be transferred from them to the animal."

"Amulets," says Adams, in his charming and learned commentary on Paulus Ægineta, "were very much used in ancient times for the cure of quartans. Alexander Traillian had great

confidence in them. Galen supposed that they owed their virtues to the physical properties of the substances which were appended" (vol. i. p. 248).

It is stated that the ague was very successfully cured by Faith, on a large scale, by Ferrarius. In the course of a twelvemonth, he cut the disease short in about fifty persons solely by slips of paper, on which he inscribed the word "febrifuge," and gave them to the patients with the instruction that they should cut off a letter every day. A Spanish lieutenant recovered by the time he arrived at the sixth letter (xxxvi., 1850, p. 161). John Hunter says, "agues have been cured by charms, which have been used with a thorough conviction of their being a sovereign remedy. I am apt to suppose that a spider's web, when taken for an ague, cures in the same way; at least in one case, for on giving it without the patient's knowledge it had not the slightest effect, but by persuading the patient that it was a spider, the effect was produced; at least the disease did not return" (ii., i. p. 360).

INTOXICATION.—Among the remedies for drunkenness, Dr. Rush (lxi., ii.) enumerates Terror, and gives in illustration the story of some young merchants who got drunk in a cabin on James's River, and were carried away by a sudden rise of the river, in consequence of a heavy fall of rain. In great danger and, no doubt, fear they floated in the current for several miles. "When they reached the shore that saved their lives, they were all sober" (p. 171). Another remedy he mentions is the excitement of a fit of Anger, and relates, on the authority of Dr. Witherspoon, the history of a man in Scotland, who was always cured of a fit of drunkenness by being made angry. The way to make him angry was, not to talk against the sin of drunkenness, but against *religion*.

In connection with psychical cures for a state of actual drunkenness, may be mentioned a psychical antidote to intemperate habits from the same author, the emotion in this case being "Resentment," but it would be more correct to say that it exhibits the power of the Will over the thirst for drink. A citizen of Philadelphia had made many unsuccessful attempts to cure his wife of drunkenness. At length, despairing of her reformation, he purchased a hogshead of rum, and, after tapping it, left the key in the door of the room in which it was placed, as if he had forgotten it. This design was to give his wife an opportunity

of drinking herself to death. She suspected this to be his motive, in what he had done, and suddenly left off drinking (p. 175).

A drunkard may be cured of his vice by the association of ideas. Immediately after drinking some spirits a gentleman became the subject of a painful attack of rheumatism. The attack was due to exposure to wet, but he associated it with the toddy he had taken, and from that time did not cease to loathe that liquor. Whenever he thought of it, his Imagination pictured the accompanying sensation of suffering in his joints; his revulsion being automatic rather than dependent on any process of reasoning. As Dr. Rush points out, Moses availed himself of this principle of our mental constitution when he made the Israelites drink the nauseous and bitter solution of the Golden Calf, by associating which, ever after, with the sin of idolatry, they were likely to hold it in detestation.

The influence of the state of the mind in modifying the ordinary action of intoxicating drinks upon the system, is shown by the circumstance that if the attention or feelings are absorbed in any matter of interest, a much larger amount can be imbibed without producing an effect on sensation and motion, than would otherwise be the case.

THREATENED DEATH.—When treating of the influence of psychological agents upon the body in causing disease, we found them sufficiently powerful to cause death itself. Conversely, there is ample evidence to show that, while the dead cannot be restored to life, the patient threatened with death may recover through the instrumentality of mental impressions. It is not necessary to dwell upon the salutary influence exerted by any circumstance which happens to excite the emotions of Hope and Joy in the sick-room; or the beneficial influence of satisfactorily settling affairs of business, etc. "I have known many recoveries from imminent danger," observes Dr. Badely, "by the relief which the mind experienced after making a will; and most of that danger might have been prevented by having made it when in health."

I have now sufficiently illustrated the remarkable influence exerted by mental states, as Imagination, Expectation, Faith, Hope, and Joy, in curing disease. To these cases might have been added a large number which I have collected together, in which the same influence was present, and was, in all probability, the operative cause, which I have rejected because they might be

objected to, inasmuch as certain agencies were employed, to the power of which the cures were, and still are, by many persons, attributed. Those who have visited the continental churches will remember the large number of crutches, sticks, splints, etc., which have been left there by those who have (there is no reason to doubt), been cured or relieved of contracted joints, rheumatism, and palsy, by prayers offered up to some saint, or by the supposed efficacy of their relics. Although I have no doubt that the influence of Imagination and Faith sufficiently explains the success of the method adopted in these cases, I exclude them as evidence for the reason above stated. So with the cures performed by Prince Hohenlohe,¹ as the Roman Catholic might attribute them to supernatural agency transmitted through a Priest, as the modern spiritualist² maintains that he was a Medium; and as the Animal Magnetist claims them as a result of a magnetic influence passing from the princely healer to the patient, I shall not adduce them as illustrations of the action of the Mind upon the Body in the cure of disease. The letter written by a Prince of the Blood—the ex-King of Bavaria—to the Count von Sinsheim, describing his own case, is, however, too curious to be omitted here:

MY DEAR COUNT:

There are still miracles. The ten last days of the last month, the people of Würzburg might believe themselves in the times of the Apostles. The deaf heard, the blind saw, the lame freely walked, not by the aid of art, but by a few short prayers, and by the invocation of the name of Jesus. . . . On the evening of the 28th, the number of persons cured, of both sexes, and of every age, amounted

¹ His name and titles had probably much to do with his influence. They were Alexander Leopold Franz Emmerich, Prince of Hohenlohe-Waldenburg-Schillingsfürst, Archbishop and Grand Provost of Grosswardein, Hungary, and Abbot of St. Michael's at Gaborjan. Born 1794, in Waldenburg; educated in several Universities; he officiated as Priest at Olmütz, Munich, etc. When twenty-six he met with a peasant who had performed several astonishing cures, and from him caught the enthusiasm which he subsequently manifested in healing the sick. He constantly appealed to their faith in his power.

² See in the Spiritualist Magazine, Nov. 1867, an article by William Howitt, from which the particulars given in the text are taken. In regard to Spiritualism, we would pursue the same course as in Animal Magnetism, not say that the alleged phenomena are impossible *because* the Imagination, etc., can work wonders, but simply confine ourselves, for our present object, to the collection of cases which certainly are the result of psycho-physical influences. If the spiritualistic cases of healing are not more wonderful, then clearly we are not justified in calling in another principle to explain them. If they are, by all means utilize them.

to more than twenty. These were of all classes of the people from the humblest to a prince of the blood, who, without any exterior means, recovered, on the 27th at noon, the hearing which he had lost from his infancy. This cure was effected by a prayer made for him during some minutes, by a priest who is scarcely more than 27 years of age—the Prince Hohenlohe. Although I do not hear so well as the majority of the persons who are about me, there is no comparison between my actual state and that which it was before. Besides, I perceive daily that I hear more clearly. . . . My hearing at present is very sensitive. Last Friday, the music of the troop which defiled in the square in the front of the palace, struck my tympanum so strongly, that for the first time, I was obliged to close the window of my cabinet. The inhabitants of Würzburg have testified, by the most lively and sincere acclamations, the pleasure which my cure has given them. You are at liberty to communicate my letter, and to allow any one who wishes, to take a copy of it.

LOUIS, PRINCE ROYAL.

BRUCKENAU; July 3rd, 1822.

So, likewise, Professor Onymus, of the University of Würzburg, reporting on the cases cured by Prince Hohenlohe which he himself witnessed, gives the following:

“Captain Ruthlein, an old gentleman of Thundorf, seventy years of age, who had long been pronounced incurable of paralysis, which kept his hand clenched, and who had not left his room for many years, has been perfectly cured. Eight days after his cure he paid me a visit, rejoicing in the happiness of being able to walk freely.

“A man, of about fifty, named Bramdel, caused himself to be carried by six men from Carlstadt to the Court at Stauffenburg. His arms and legs were utterly paralyzed, hanging like those of a dead man, and his face was of a corpse-like pallor. On the prayer of the Prince he was instantly cured, rose to his feet, and walked perfectly, to the profound astonishment of all present.

“A student of Burglauer, near Murmurstadt, had lost for two years the use of his legs; he was brought in a carriage, and though he was only partially relieved by a first and second prayer of the Prince, at the third he found himself perfectly well.

“These cures are real, and they are permanent. If any one would excite doubts of the genuineness of the cases operated by Prince Hohenlohe, it is only necessary to come hither and consult a thousand other eye and ear witnesses like myself. Every one is ready to give all possible information about them.”

Father Mathew, in our own day, if not so successful as Prince Hohenlohe, relieved a large number of persons, and on exactly the same principle. The reason which induced us not to employ the Prince's cures in evidence applies therefore equally to his.

Let us, however, assume for a moment that in both cases their prayers, as affirmed by themselves and their adherents, were the cause of their remarkable success. The difficulty at once arises that in Father Mathew's case, the same diseases which he had cured during his lifetime, were just as effectively relieved after his death by visiting the good Father's tomb, in the firm faith that a miracle would be performed. The readers of his Life know that many a cripple left his crutch there. In such instances the analysis of the agencies possibly at work is rendered much easier from the absence of several to which some would assign, in other instances, a therapeutic virtue. No living body, therefore no animal magnetism. No infinitesimal doses, therefore no homœopathy. No drugs of any kind, therefore no physic. No Medium, therefore no spiritual influence of that kind. No priest, therefore no prayers over the patient.

All these being eliminated, nothing would seem to remain but the influence of expectant Faith, an influence called into powerful operation by the supposed miraculous power of the deceased, augmented doubtless by the excitement occasioned by crowds flocking, with a common sympathy, to the same spot. A woman, bedridden for years, is carried or manages to crawl there, the deepest emotions are stirred—hope, longing, belief—and she finds a new power in her system; an impetus is conveyed to the limbs, and she walks home with ease. Her cure kindles the faith of others, and it is not unlikely that the combined influence of her sudden recovery of the use of her limbs, and the imaginary virtues of the tomb, would restore some to health, for whom the latter alone would have been insufficient. The epidemics of cure are as definite, and admit as easily of study, as the epidemics of disease. They will also equally repay the labor bestowed upon tracing their causes, their rise and decline, and their extent. Why they should decline is, perhaps, more difficult to explain than why they should arise.

Again, from the same point of view, although I do not include cases of insanity in my collection of illustrations, since they are examples of the influence of the mind upon its own organ, I may refer to the means employed till quite recently at Gheel¹ for the cure of the insane.

¹ There is a legend that in the ninth century the daughter of an Irish King (Dymphna) fled from her father's persecution on account of her having become a

In 1862, when I visited the "City of the Simple," I saw the room where the lunatic is lodged, when the evil spirit with which he or she is possessed is exorcised. (Here it is orthodox to regard madness as identical with possession.) Six months previously a lady had occupied it. The priest came to her every day with a relic, and performed the customary incantations. The result was perfect recovery within nine days. If not cured within that period, a patient is allowed to stay eighteen days, and then, if no change takes place in his condition, he is discharged. The cures, I was informed, have been numerous; but now scepticism is undermining the superstition upon which they depend; the doctors feel ashamed of the delusion; and the priests have to yield their claims to those of legitimate medicine, and are very likely half ashamed themselves. Patients who would have been sent to the church of St. Dymphna, are placed in the new Asylum of Gheel, but if only physical therapeutics are employed, they may not recover so quickly. There is no reason, whatever, to doubt these asserted cures resulting from a belief in the efficacy of the fusty old bones of the saintess. As a *ποῦ στῶ*, upon which Faith may repose securely, they serve just as well as a pill of bread or a globule of sugar of milk.

We have also in this chapter excluded cases of cure by the Royal Touch, for although when they occurred they may fairly be attributed to the expectant Faith of the patient, some would urge that the possibility of a mesmeric influence passing from A to B was not out of the question. To prevent any exception being taken, we therefore dismiss such instances, but can hardly avoid referring to one case which affords an amusing proof of the important results which may flow from attributing such cures to a wrong source. Browne, of Norwich, surgeon to King Charles II., published a book called *Adenochoradologia, or a Treatise of*

Christian. He followed her to Gheel, and, having discovered her retreat, beheaded her. Several lunatics who happened to witness the deed were cured on the spot. Admitting the fact, the cures at this stage of the history may be referred to a powerful and painful emotion. The cures were, of course, regarded as miraculous, and Dymphna was duly canonized. The number who subsequently flocked to her tomb was so great that, in course of time, a colony sprung up, and a sane population became accustomed to take charge of the insane in their humble cottages. I visited the Church of St. Dymphna, where her acts are recorded in oak, from the day of her birth to that of her death. Here her relics are preserved, and are still occasionally employed to minister to minds diseased.

Glandules and the Royal Gift of Healing them. In it is the account of the case of a child which we cite here: "A Nonconformist child, in Norfolk, being troubled with scrofulous swellings, the late deceased Sir Thomas Browne, of Norwich, being consulted about the same, his majesty being then at Breda or Bruges, he advised the parents of the child to have it carried over to the king (his own method being used ineffectually); the father seemed very strange at his advice, and utterly denied it, saying the touch of the king was of no greater efficacy than any other man's. The mother of the child, adhering to the doctor's advice, studied all imaginable means to have it over, and at last prevailed with her husband to let it change the air for three weeks or a month; this being granted, the friends of the child that went with it, unknown to the father, carried it to Breda, where the king touched it, and she returned home perfectly healed. The child being come to its father's house, and he finding so great an alteration, inquires how his daughter arrived at this health. The friends thereof assured him, that if he would not be angry with them, they would relate the whole truth; they having his promise for the same, assured him they had the child to be touched at Breda, whereby they apparently let him see the great benefit his child received thereby. Hereupon the father became so amazed that he threw off his Nonconformity, and expressed his thanks in this manner: 'Farewell to all dissenters, and to all nonconformists; if God can put so much virtue into the king's hand as to heal my child, I'll serve that God and that king so long as I live, with all thankfulness.'" Thus the importance of a knowledge of the influence of Mind upon Body is shown even in regard to the choice of a religion. It is a pity that there was change of air as well as the touch of Royalty to disturb the inference drawn from the improvement following the latter. If it be attributed to change of scene rather than air, we might still claim the agency as psychical. Mere change of locality, as is well known, will often benefit a patient, although the change, as regards air, be a change for the worse. The remedy acts upon the body through the mind or imagination. A hospital patient has an ill-conditioned sore, and does not go on well; he is removed to another ward, and the vital action in the part may at once assume a healthy appearance. A little psychical nitrate of silver has been employed, and has stimulated the granulations more effectually than its local application previously.

In reference to the Royal Touch, there is a curious passage in Aubrey. "The curing of the King's Evil," he says, "by the touch of the King, does much puzzle our philosophers, *for whether our kings were of the house of York or Lancaster*, it did the cure for the most part." In other words, the Imagination belongs to no party, guild, or creed.

CHAPTER XVII.

PSYCHO-THERAPEUTICS.

PRACTICAL APPLICATION OF THE INFLUENCE OF THE MIND ON THE BODY TO MEDICAL PRACTICE.

WE now approach the consideration of the question, How can the foregoing facts, proving, as they do, the great influence which mental states exert over the body in disease, be practically applied for therapeutic purposes? Can this unquestionable power be controlled and directed? Ought we deliberately to cause a mental shock? We have seen that gout may be cured by the patient's window being smashed by a wagon or by his house being set on fire. May we not imitate these accidents to obtain the same end?

Section I.—General Influence of the Physician upon the Patient in Exciting those Mental States which act beneficially upon the Body in Disease.

No one disputes that the physician and the surgeon can, and constantly do make use of this agent, in their mode of addressing their patients, in the hope and confidence which they endeavor to inspire, and in the removal of everything calculated to depress them.

“Sunt verba et voces, quibus hunc lenire dolorem
Possis, et magnum morbi deponere partem.”

It is, however, a striking illustration of the relative degree in which psychical and physical remedies have been cultivated that in Pereira's *Materia Medica*, which includes in its range the *Remedia Psychica*, the observations upon these remedies are compressed within three pages. While, however, he points out the difficulty of producing, regulating, and controlling psychical remedies, he allows that they are by no means unimportant and ought not be neglected. He disposes of the influence of the Imagination in two lines.

Few physicians have had more practical experience of disease than the celebrated Dr. Rush, and his testimony to the good effects of inspiring confidence, even in active disease, is clear and forcible. "I have," he says, "frequently prescribed remedies of doubtful efficacy in the critical stage of acute diseases, *but never till I had worked up my patients into a confidence bordering upon certainty of their probably good effects.* The success of this measure has much oftener answered than disappointed my expectations" (lxi., i. p. 257). He attributes the cure to the vigorous concurrence of the Will with the action of the medicine.

In the *Lancet* of December 18, 1869, Dr. John Tanner advocates the treatment of hysterical aphonia by electro-magnetism, applied to the tongue only, and states that in more than fifty cases he had applied it without being unsuccessful in any. He reports four cases: In the first the patient's voice returned with a loud scream; in the second the voice at once returned; in the third the voice returned, was lost again in about ten minutes, and was permanently restored after a repetition of the remedy; in the fourth the voice instantly returned. In his commentary upon these cases Dr. Tanner remarks, "It is all important, before you apply electro-magnetism, to convince your patient *that she will be cured*; for if you fail in your powers of persuasion, it is probable the result of its application will not be satisfactory." This almost amounts to a confession that the application is worth little in itself, but that the cure is really effected by powerfully appealing to the Imagination and making use of means which the patient may well believe calculated to produce a decided effect.

It is certainly extraordinary that notwithstanding the acknowledged influence of mind in the action of drugs, its disturbing effect is rarely taken into account, practically, by physicians. Hence to a large extent the utterly contradictory reports made in regard to the action of new medicines; hence the humiliating amount of fashion in the favor with which remedies are received, and then deserted to give place to others equally be-praised and equally uncertain. Among those physicians who have freely recognized this fruitful source of fallacy, Dr. Wilks has spoken out most emphatically in his *Lectures on the Nervous System*. "The doctor," he observes, "soon finds that in treating his patient, the practice of medicine is not only one of physic, but of psychology, and that the effect of his drugs *depends as much upon*

the constitution of the patient's mind as his body. I know several persons, amongst others, two notable examples in our profession, who say they cannot take physic; they mean that two or three grains of rhubarb will violently purge them, that a few drops of opium upset their livers and stomach for several days, that three grains of iodide of potassium will cause coryza and headache, and so on through the whole list of drugs. These very unpleasant people and unsatisfactory patients are counterbalanced by our old and steadfast adherents, who ask for a prescription with confidence, and declare that whatever you give them does them good" (cix. p. 598).

Whether, and to what extent, the physician may avail himself of Fear in the treatment of disease, has often been discussed. It cannot be denied that, while inflicting a great deal of suffering, it has been successful in not a few instances, as in the case of the lady that was cured of the vapors by a Noble Lord, who arranged that in the midst of one of her most violent fits, four mutes dressed in white, should enter her apartment, slowly approaching, and take her without violence in their arms, and without giving her time to recollect herself, convey her into a distant chamber hung with black and lighted with green tapers! (lxxxvi. p. 26). Dr. Crawford, of Baltimore, is related to have advised a patient, who fancied he was dying of liver disease, to travel. On returning he appeared to be quite well, "but upon receiving information of the death of a twin brother, who had actually died of a scirrhus liver, he immediately staggered, and falling down, cried out that he was dead; and had, as he always expected, died of a liver complaint. Dr. Crawford being sent for, immediately attended; and on being informed of the notion which had seized the hypochondriac, exclaimed 'Oh, yes, the gentleman is certainly dead, and it is more than probable his liver was the death of him. However, to ascertain the fact, I will hasten to cut him open before putrefaction takes place.' He called for a carving knife, and whetting it, as a butcher would to open a dead calf, he stepped up to him, and began to open his waistcoat. The hypochondriac became so terribly frightened, that he leaped up with the agility of a rabbit, and crying out 'Murder! murder! murder!' ran off with a speed that would have defied a score of doctors to catch him. After running a considerable distance, until he was almost exhausted, he halted; and not finding the

doctor at his heels, soon became composed. From that period this gentleman *was never known to complain of his liver*; nor had he for more than twenty years afterwards, any symptoms of this disease!" (op. cit. p. 149).

Fear no doubt acts beneficially through the Will—that is to say, in presence of a greater evil, the patient resolves not to yield to the lesser one, knowing that if he does not yield, he will escape its infliction. Under this class, fall those numerous cases in which nervous symptoms—convulsions, spasms, etc.—are at once controlled by the threat of unpleasant consequences.

We cannot, however, expect that beyond the salutary awe, which in some nervous cases it may be desirable for the patient to feel for the physician, the emotion of Fear will be beneficially employed, and we fully unite with Esquirol in his remarks on its employment in epilepsy. "We reject," he says, "as dangerous, the salts of copper and nitrate of silver, how many miracles soever may be attributed to their use. We can say as much of Fear, which is recommended by some rash persons. But who can calculate the effects of Fear, and consequently, who would dare to make use of it, as a curative agent?"

Section II.—Importance of Arousing the Patient's Will.

The power of the Will in resisting disease apart from the influence of the Imagination or the concentration of the Attention, is unquestionable. "Oh, if I could once make a resolution, and determine to be well!" exclaimed the German physician Walderstein.

The poet Churchill said—

"The surest road to health, say what they will,
Is never to suppose we shall be ill;
Most of those evils we poor mortals know
From doctors and *imagination* flow."

It is a pity, however, that we have to confess that the poet died at the early age of thirty-four (of fever). We must conclude that his dissipated life neutralized the good effects likely to result from supposing that he should not be ill.

At a *séance* of the Royal Academy of Medicine of Paris, Dr. Barthélemy expressed his conviction that the symptoms of hydro-

phobia in man were mainly due to the imagination and irritability of the patient. In proof of this he adduced his own case. He had introduced his finger into the throat of a mad dog, and drew it out covered with frothy saliva; in drying it he observed that he had a slight excoriation on his finger. He lightly cauterized it, but ten days after, he experienced a sense of constriction about the throat. He felt alarmed; the difficulty of swallowing increased until he could not drink anything, and the sight of water caused spasms. The Will, however, was strongly exercised, and at last gained the day; the symptoms gradually abated, and in about a week he was well (lx. p. 140).

An event in the life of Andrew Crosse, the electrician, illustrates in a striking manner the power of the Will over threatened disease, the symptoms in his case being those of hydrophobia. It would seem to illustrate the force of this influence, not only directly over the incipient irregular action of certain motor nerves and muscles, by forcing them into healthy exercise, but over the automatic action of the cerebrum itself, by resolutely arresting the train of ideas which have been excited. If "an act of the Will frequently excites such changes in the brain as to arrest an incipient paroxysm of angina pectoris or epilepsy," (Laycock), there seems no reason why it should not exert the same influence over the symptoms present in this case.

Mr. Crosse was severely bitten by a cat, which died the same day hydrophobic. He appears to have thought little of the circumstance, and was certainly not nervous or imaginative in regard to it. Three months, however, after he had received the wound, he felt one morning great pain in his arm, accompanied by extreme thirst. He called for a glass of water. The sequel will be best told in his own words: "At the instant that I was about to raise the tumbler to my lips, a strong spasm shot across my throat; immediately the terrible conviction came to my mind that I was about to fall a victim to hydrophobia, the consequence of the bite that I had received from the cat. The agony of mind I endured for one hour is indescribable; the contemplation of such a horrible death—death from hydrophobia—was almost insupportable; the torments of hell itself could not have surpassed what I suffered. The pain, which had first commenced in my hand, passed up to the elbow, and from thence to the shoulder, threatening to extend. I felt all human aid was useless, and I

believed that I must die. At length I began to reflect upon my condition. I said to myself, either I shall die or I shall not; if I do, it will only be a similar fate which many have suffered, and many more must suffer, and I must bear it like a man; if, on the other hand, there is any hope of my life, my only chance is in summoning my utmost resolution, defying the attack, and exerting every effort of my mind. Accordingly, feeling that physical as well as mental exertion was necessary, I took my gun, shouldered it, and went out for the purpose of shooting, my arm aching the while intolerably. I met with no sport, but *I walked the whole afternoon, exerting, at every step I went, a strong mental effort against the disease.* When I returned to the house I was decidedly better; I was able to eat some dinner, and drank water as usual. The next morning the aching pain had gone down to my elbow, the following it went down to the wrist, and the third day left me altogether. I mentioned the circumstance to Dr. Kinglake, and he said he certainly considered that I had had an attack of hydrophobia, which would possibly have proved fatal had I not struggled against it by a strong effort of mind" (*Memoirs of Andrew Crosse*, p. 125).

In hysteria, the influence of the Will *versus* the reflex action of voluntary muscles is constantly seen. Mr. Skey records the case of a young lady of sixteen, who for many months had been suffering from inversion of the left foot, which was twisted at right angles with the other, and was treated by orthopædic surgeons with an elaborate apparatus of splints. Neither they nor Mr. Skey (though he recognized the nature of the affection) succeeded in curing it. Psychical agents, however, effected a cure in a few minutes. She willed to use her foot like other people, and she did. "She accompanied her family to a ball, her foot, as she entered the ball-room, being not yet restored to its normal position. She was invited to dance, and under this novel excitement she stood up, and to the astonishment of her family, she danced the whole evening, having almost suddenly recovered the healthy, muscular action of the limb. She came to see me," adds Mr. Skey, "two days afterwards. She walked perfectly well into my room, and paced the room backwards and forwards with great delight. The actions of the limb were thoroughly restored, and all traces of the previous malady had disappeared" (xlv., October 13, 1866). Fortunately no quack medicine or doctor aroused the

Will in this case; fortunately, not only because they would have had the credit of the cure, but because the reality of the disorder would have been denied by those who have still to learn that such recoveries are possible, and that it is one thing to admit the virtue of inert remedies, and another thing to recognize the secret of their frequent success.

The influence of the Will in controlling disease has already been incidentally referred to in the case of Irving. His own account of an attack of cholera may be made use of advantageously here.¹ During the invasion of the cholera in 1832, he was "seized with what was in all appearance, and to the conviction of medical men when described to them, that disease which has proved so fatal to so many of our fellow creatures." He had risen in perfect health at his usual early hour. By breakfast time he had become very cold, and was laboring under severe pain. His appearance shocked his friends. Vomiting succeeded, and wringing or gnawing pains,² and being so weak that he could not sit up, he lay on the bed wrapped in blankets till he had to set out to preach, at half past eleven. It appears that he had a little brandy and arrowroot, but felt no better. With sunken eyes, pallid cheeks, and an altogether ghastly appearance, he tottered to the church, a quarter of a mile distant, and found another minister officiating for him. He was tempted to shrink back, but summoned resolution to tell his beadle to go into the pulpit and inform him that he would shortly take his place. In the mean time, he stretched himself on three chairs in the vestry before the fire. "Even as I shifted my position I endured much suffering, and was almost involuntarily impelled to draw up my limbs in order to keep the pain under. Nevertheless, when I stood up to attire myself for the pulpit, and went forward to ascend the pulpit stairs, the pain seemed to leave me." His sight was dim, his head swam, he breathed with difficulty, he laid hold of the pulpit sides and looked wistfully about, wondering what would befall him. The crisis came. "That instant a cold sweat, chill as the hand of death, broke out all over my body, and stood in large drops upon my forehead and hands. From that moment

¹ It should be observed that he held and preached that disease is sin, and that no one with faith need or ought to yield to it.

² A medical friend informs me that, to his knowledge, Irving labored under severe diarrhoea, and that his state at one time was that of dangerous collapse.

I seemed to be strengthened." He preached upwards of an hour with more unction than he had ever done before. After the service he walked home, eating little or nothing. Yet he preached in the evening in a crowded schoolroom, and next morning rose before the sun to pursue, "with renewed strength," what he regarded as his course of duty. The narrative, Mrs. Oliphant suspects, may cause some to smile, but it is impossible not to admire so resolute though mistaken a man (*The Life of Edward Irving*, vol. ii. pp. 309-13).

Section III.—Systematic Excitement of a definite Expectation or Hope, in regard to the beneficial Action of totally inert Substances.

We may in a definite manner excite Hope, and direct it in a particular channel, by leading the patient to expect a certain result from drugs in which he has faith, but which are *totally* inert.

That this course may be systematically and successfully pursued, the cases which follow prove:

M. Lisle, who has, among French physicians, especially recognized the importance of acting upon the Imagination, making it, as he expresses himself, "un levier puissant, plus précieux que tous vos remèdes," but who declares he is not able to explain why it is so potent an agent,¹ adopts the plan of treating some of his cases by pills composed of nothing more potent than bread crumb, and the results are what might be expected from the facts contained in this work. Of these pills, covered with silver leaf, he has two sets; the boxes containing one set labelled "*Pilules argentées anti-nerveuses*," and the others "*Purgatives*." He had in his establishment a hypochondriac who believed himself to be the victim of obstinate constipation, although in point of fact the bowels were regular. Of purgatives he had taken every form, but, he affirmed, without any result. Dr. Lisle refused to give him any medicine, and was in consequence incessantly importuned, and even abused by his patient. At last, one day, wearied out, he professed to yield to his solicitations, and told him he was about to give him the most violent purgative he

¹ "I am not German or metaphysician enough to venture into this obscure region, I prefer frankly confessing my ignorance, and even that I only know that I know nothing about it. The fact stares me in the face, patent and indisputable, and *that* suffices me."

knew, and that it would certainly render him very ill. With the greatest delight he obeyed Dr. Lisle's orders to take five of the pills from his "purgative" box, an interval of a quarter of an hour being allowed between each. After the third dose the patient was well purged, and within seven hours the bowels were acted upon more than twenty times. He was jubilant at the successful operation of this new purgative, but was almost in a state of collapse with the attack, which, Dr. Lisle says, he can only compare "*à une attaque de cholérine des plus intenses.*" However, this proved to be a crisis in the patient's history, and the commencement of his recovery from Delusional Insanity (*L'Union Médicale*, October 23, 1861).

The following series of cases from *The British and Foreign Medical Review*, January, 1847, was communicated by a naval surgeon, whom the editor, Sir John Forbes, characterizes as an officer of long standing and much experience, whose name and high character were known to him.

"A very intelligent officer had suffered for some years from violent attacks of cramp in the stomach. He had tried almost all the remedies usually recommended for the relief of this distressing affection; and for a short period prior to coming under care, the trisnitate of bismuth had been attended with the best results. The attacks came on about once in three weeks, or from that to a month, unless when any unusual exposure brought them on more frequently. As bismuth had been so useful, it, of course, was continued; but notwithstanding that it was increased to the largest dose that its poisonous qualities would justify, it soon lost its effect. Sedatives were again applied to; but the relief afforded by these was only partial, while their effect on the general system was evidently very prejudicial. On one occasion, while greatly suffering from the effect of some preparation of opium, given for the relief of these spasms, he was told that on the next attack he would be put under a medicine which was generally believed to be most effective, but which was rarely used on account of its dangerous qualities, but that, notwithstanding these, it should be tried provided he gave his assent. This he did willingly. Accordingly, on the first attack after this, a powder containing four grains of *ground biscuit* was administered every seven minutes, while the greatest anxiety was expressed (within the hearing of the party), lest too much should be given. The fourth dose

caused an entire cessation of pain. Half-drachm doses of bismuth had never procured the same relief in less than three hours. For four successive times did the same kind of attack recur, and four times was it met by the same remedy, and with like success! After this my patient was ordered to join another ship on a different station."

In the next case, treated by the same medical man, constipation was relieved by the psychical method.

"A seaman had suffered from four successive attacks of constipation. So far as could be detected, there was no organic disease to account for its occurrence. The symptoms were such as usually follow protracted constipation of the bowels; and on all four occasions large and repeated doses of the strongest purgatives (croton oil included), powerful enemata, cold affusion, and hot baths had all been required to be persevered in to procure relief. On the fifth attack, he was put under grs. ij of bread pill every seven minutes; much anxiety being, of course, expressed to guard against any over-dose, as well as to watch the effect of what was thus given. Within two hours he became sick (*one of the symptoms expected from the medicine*), and his bowels were freely open almost immediately after; nor did they again become constipated so far as I am aware."

Severe gastric and intestinal pain was removed in the following interesting case by a like appeal to the Imagination, and is graphically described by the same hand:

"In July, 1845, the company of H. M. S. ——— were attacked with an epidemic bowel complaint, terminating in simple diarrhoea in some, but going on to dysentery in many. In every one of the latter cases, tapeworms (whether a cause or merely an effect I am unable as yet to divine) showed themselves. Amongst others who suffered was H. B—, a first-class petty officer, who had but a mild attack of dysentery, but who was much distressed towards the latter part of his attack by tapeworm appearing in considerable quantities. As the dysenteric symptoms disappeared, these worms were attempted to be dislodged by every means that could be devised, and for a time it was supposed these means had been successful; but, as I feared, at too great a sacrifice, seeing the pain arising (as I fancied) from the large doses of powerful medicine necessary to effect this difficult object, continued around the pyloric orifice of the stomach and upper portion of the small

intestines to be most distressing. Counter-irritations were applied until the skin became callous, sedatives administered until the man's senses became muddled, but no course of treatment seemed to afford the least relief. This being so, I determined to try the effect of mental influence. Stating to him, as I did to the other men, that his disease was most obstinate, so was it necessary to have recourse to desperate means to relieve it; that, with his sanction, I would therefore put him under a medicine which it was most necessary to watch with the greatest attention, lest its effects should prove most prejudicial, perhaps fatal, etc. Having by these statements made an impression, it became necessary to keep it up. This was done by repeated visits at all hours of the day and night, and by expressing on these occasions the most intense anxiety as to the effect of the very powerful and dangerous medicaments. This was not a case in which a sudden effect could be expected to be produced, whatever might be the means employed. Symptoms of disease existed which bore too close a resemblance to those of an organic order to admit of hope of a sudden, if even of tardy, relief. Hence the pills (*bread*, of course) were given every sixth hour only. Within twenty-four hours the man's sufferings were decidedly less. Within four days he was almost free from pain. On the sixth day he was quite so, his pills were omitted, and at the end of a fortnight he was again at duty with a clear eye, a healthy skin, and was rapidly regaining his flesh. Here, as in most cases where this method has been tried, the diet and drink have been left unrestricted. Occasionally, however, it became necessary to taboo some article, lest its coming in contact with the remedy might prove most destructive; in other words, articles are occasionally forbidden when the mind seems to be inclined to lose sight of what must be made the all-important subject of thought by night and day. The wonderful improvement in this man's state was frequently commented on by both officers and men, who, of course, were, and still are, as little acquainted with the means employed as the patient himself was.

"It may be said this case, as here given, goes for nothing, in so far as it does not show that the pains were anything but casual; in which case any other mode of treatment, or very likely no mode at all, would have been equally successful; or it may be, again, as it has before been said, that it was altogether feigned,

and that the commanding officer would have made a better and quicker cure. I think not; for the following reasons: the man's flesh had wasted; his eye became sunken; his skin sickly in hue, as well as in feeling; his sleep, when he had any, was of the most disturbed character. But, more than all, the pain after some weeks returned, and the other bad symptoms followed in its wake; *yet both it and they were again relieved a second time by the same means.* While suffering from a third attack, he was sent to the Royal Naval Hospital at Malta, and then, after much suffering, he brought up by vomiting a portion of the mucous membrane of one of the small intestines, distinctly marked by two, at least, of the valvulæ conniventes. I am assured by one of the officers of the establishment that he most carefully examined this ejected matter, and that its characters were so marked that there could be no room for a doubt as to what it was. This being so, we have pretty clear proof that disease existed long before this slough was thrown off; and that even this organic disease was suspended, on two occasions, by mental influence only."

Sir John Forbes concluded his celebrated article on "Young Physic" in the *British and Foreign Medical Review* (January, 1846), with a dozen suggestions for medical practice, one of which was "To encourage the administration of simple, feeble, or *altogether powerless*, non-perturbing medicines, in all cases in which drugs are prescribed, *pro formâ*, for the satisfaction of the patient's mind, and not with the view of producing any direct remedial effect." Whether his advice has been adopted to the extent which it deserves may well be doubted. Nothing can justify asserting what is not true in order to gain the patient's confidence—a course adopted in some of the foregoing cases—but this forms no essential part of the method of treatment now referred to. At the same time it is liable to degeneration into it. See observations on page 126 of this work.

Section IV.—Systematic Direction of the Attention to a Particular Region of the Body.

The Attention may be definitely directed to the part affected, accompanied by the expectation of a certain result, without the administration of inert drugs.

Dr. Carpenter gives several cases which well illustrate this

method. A gentleman, somewhat hypochondriacal, required a daily aperient, being costive from sedentary pursuits. When medicine lost its effect, he applied to a medical man for advice, who, seating his patient before him with the abdomen uncovered, requested him to direct his attention exclusively to the sensations he experienced in that region, acting upon his Expectation by assuring him that the desired action of the bowels would be secured, and pointing with his finger along the course of the arch of the colon and small intestines, so that his current of thought might pursue that direction. The experiment very shortly succeeded, "and for some time after the bowels continued to act freely without medicine." It may be added in illustration of the same principle, though the case was not therapeutic in character, that a lecturer was put to great inconvenience on one occasion by the threatened action of the bowels during the lecture. His Will triumphed; but ever afterwards he was troubled in the same way when he went to the same lecture-room, whatever precaution he might take, but not when he lectured elsewhere (viii. p. 953).

Although it is well known that powerful emotions act strongly upon the uterine functions, it is not so well understood how marked an influence an intellectual faculty, in the form of concentrated Attention, exerts over them. A striking case is reported by Mr. Braid, which illustrates this fact very clearly. The effect took place, moreover, in a state of the system *not* rendered susceptible at the time by his special method. He had on previous occasions relieved a state of amenorrhœa by a mixed method, partly hypnotic and partly mental, but it then occurred to him that, inasmuch as he attributed his success in her case entirely to fixed mental Attention with a predominant idea (and faith in the result), he might succeed by the psychical process alone, *without sending her to sleep*—wide-awake, in fact. He tried the experiment, addressing her thus—"Now, keep your mind firmly fixed on what you know should happen." In the meanwhile he allowed his own will to be passive, and read a book. At the expiration of eleven minutes the experiment ended, and the desired result took place within that period. The same treatment was adopted when required on subsequent occasions, and with the same success, with one exception, on which it is not less interesting to remark that the failure was due to her inability to fix her attention, "from having been put out of the way just

before she came" to Mr. Braid, and not expecting that the operation (if it may be called so) would succeed. To fix her attention thoroughly, therefore, it became necessary to hypnotize her, and then the function was restored (xxiii. p. 95-6). This case shows the value of Attention, pure and simple, but the greater power of the more complete psycho-physical method about to be described (Section V.).

Section V.—Combined Influence of arousing certain Mental States, and lightly Touching the Affected Part.

The same mental states may be more or less strongly called into action, assisted by a direct physical action upon the part. This is what occurs in the employment of the tractors, a very allowable mode of treatment, when the true principle at work is recognized. The Attention is first directed to the seat of disease, and is then conveyed from it, under the impression that the pain or other morbid sensation will concurrently pass away, and escape at the extremity of the limb or organ affected. Faith is no doubt a very useful adjuvant, but it does not appear to be essential; as in many instances the operator makes no appeal whatever to this principle, and the patient does not anticipate benefit from the treatment. Lastly, there is the local traction, an unquestionable influence, although merely wooden tractors are employed, and one which has been too much overlooked by those who attribute the success attending tractorism *entirely* to mental agency. It is difficult to separate these complex influences, but it is clear that the simple passing of a substance, whether it be a wooden point or a finger, over the surface of a sensitive part of the body, must in itself exert a considerable influence over its capillary circulation, apart from its action in fixing the Attention.

I have before me a large number of cases of the successful treatment of disease by tractors, both metallic and wooden; but shall only select a few, in order to show their effect. It is sufficient to maintain, for the present purpose, that part of the result was due to mental influence.

At the time when the metallic tractors of Perkins excited so much attention, and their efficacy was attributed to galvanism, Drs. Haygarth and Falconer, of Bath, selected certain patients

in the General Hospital for their experiments, employing two wooden tractors of nearly the same shape as those used by Perkins, and painted so as to resemble them in color.

The cases chosen were those of chronic rheumatism—in the ankle, knee, wrist, and hip. One attributed his pain to gout. With the exception of the hip case, the joints were swollen, and all had been ill for several months.

“Of five patients, all except one assured us that their pains were relieved, and three of them that they were much benefited by the first application of the remedy. One felt his knees warmer, and he could walk much better, as he showed us with great satisfaction. One was easier for nine hours, till he went to bed, when the pain returned. One had a tingling sensation for two hours. The wooden tractors were drawn over the skin so as to touch it in the slightest manner. Such is the wonderful force of the Imagination. [This requires some modification.]

“Next day, January 8th, the true metallic tractors of Mr. Perkins were employed exactly in like manner, and with similar effects. All the patients were in some measure, but not more, relieved by the second application except one, who received no benefit from the former operation, and was not a proper subject for the experiment, having no existing pain, but only stiffness of her ankle. They felt (as they fancied) warmth, but in no degree greater than on the former day” (lxxxiii. p. 3).

Dr. H— adds, “if any person would perform these experiments, they should be performed in due solemnity. During the process, the wonderful cures which this remedy is said to have performed, ought to be particularly related. Without these indispensable aids, other trials will not prove as successful as those which are above reported. [This is by no means certain.] The whole effect undoubtedly depends upon the impression which can be made upon the patient’s Imagination.”

Mr. Richard Smith, of the Bristol Infirmary, pursued the experiments commenced by Dr. Haygarth, and with the following results:

“Robert Thomas, æt. 43. He had for some time been under the care of Dr. Savill, in the Bristol Infirmary, with a rheumatic affection of the shoulder, which rendered his arm perfectly useless.

“April 19.—Having everything in readiness, I passed through the ward, and (in a way that he might suspect nothing) questioned

him respecting his complaint. I then told him that I had an instrument in my pocket, which had been very serviceable to many in his state; and when I explained to him how simple it was, he consented to undergo the operation. In six minutes no other effect was produced than a warmth upon the skin, and I feared that this *coup d'essai* had failed. The next day, however, he told me that 'he had received so much benefit, that it had enabled him to lift his hand from his knee, which he had in vain several times attempted on the Monday evening, as the whole ward witnessed.' [The tractors used being made of lead, Mr. Smith thought it better to substitute for the future two wooden ones.] Mr. Burton held in his hand a stop-watch, whilst Mr. Lax minuted the effects produced. In four minutes the man raised his hand several inches, and he had lost also the pain in his shoulder, usually experienced when attempting to lift anything. He continued to undergo the operation daily, and with progressive good effect; for on the 25th he could touch the mantel-piece.

"On the 27th, two common iron nails, disguised with sealing wax, were substituted for the pieces of mahogany before used. In three minutes he felt something moving from his arm to his hand, and soon after, he touched the Board of Rules which hung a foot above the fireplace. This patient at length so far recovered that he could carry coals, etc., and use his arm sufficiently to assist the nurse; yet, previous to the use of the spurious tractors, he could no more lift his hand from his knee, than if a hundred-weight were upon it, or a nail driven through it, as he declared in the presence of several gentlemen. The fame of this case brought applications in abundance.

"Thomas Ellis, a negro, from a chronic rheumatism in his upper and lower extremities, had been incapable of walking without support, or feeding himself, for four months. He came under my care on the 19th of April. At first the tractors produced no effect upon his thighs, and but little upon his arms. In the course of a few applications, however, he began to move his limbs better, and his nights were not so restless. He complained also that the cicatrice of an old scald upon his arm smarted a great deal. He now began to mend so fast that he could comb his hair very readily, and on the 29th he put on his jacket and walked across the ward without a stick or the least assistance. In the course of this case, the nails, lead, and wood

were used alternately; but there did not appear to be the least difference in the result.

"My patients crowded in upon me so fast that I had not leisure to bestow more than four or five minutes upon each; yet such effects were produced as were almost incredible. It usually happened that the skin was soon warmer, and occasionally darting pains were produced, which sometimes were troublesome long after the operation, and at others were of shorter duration.

"John Peacock, a patient of Dr. New, had been affected for four months with a weakness of the hip, and severe rheumatic pains, brought on by working in a damp coal-pit. At first the tractors occasioned considerable pain, and very restless nights (I use his own words), but after a few trials he began to sleep unusually well, and had fewer attacks of pain, and appeared confident and happy in the idea that a remedy had been discovered for his complaints.

"With such a subject, the event may be easily anticipated. This morning he came to thank me for my services, and he was always exceedingly grateful to Mr. Barton and Mr. Gainsford, who operated upon him in my absence. I cannot help mentioning one circumstance respecting this man. He came to me one day complaining of a violent settled pain in his forehead, which he said almost distracted him, and requested me to draw it out. The pieces of mahogany were drawn gently over his forehead for a minute and a half, when the throbbing began to abate, and in two minutes had nearly ceased. In about three or four minutes the man arose from the chair, saying, 'God bless you, sir, now I am quite easy.' He was attacked with this pain only once afterwards, which affected his vision considerably, but it was removed as easily as in the former instance.

"All these cases turned out so happily, it may be imagined that they are *selected*. I declare, however, that they are the first that occur in the Minute Book; and if I could imagine it necessary to add more, there are several remaining equally successful." Dr. Haygarth gives the following:

"Benjamin Quarman, who had received but little benefit from medicine, was obliged for some time to hobble upon crutches with much difficulty and in great pain. He attributed his illness to a violent cold, caught by working in the mud on a pair of dock-gates. I must add, however, that he had been all his life a

plumber, which contributes, perhaps, not a little to his indisposition. Upon the first application of the tractors (which were formed from a piece of bone) to his thigh, he experienced a pricking sensation; in a few minutes he could hardly persuade himself that they did not cut him; at the end of the operation he could use his limbs more freely, but complained that I had driven the pain into his knee. He was under the care of Dr. Moncrieffe, who was present when Mr. Lax relieved him, in a few minutes, of a pain which had been for some time fixed in the shoulder-blade. This man recovered considerably the use of his lower extremities, and was able to comb his hair easily, which the stiffness and pain in his shoulder had heretofore prevented him from doing" (op. cit.).

Dr. Alderson adopted the same course of treatment in the Infirmary at Hull, with what result will be seen in the following case, which is taken from the same work:

"Robert Wood, æt. 67, on June 4th was operated upon with (wooden) tractors for a rheumatic affection of the hip, which he has had for these eight months. During the application of the tractors, which was continued for seven minutes, no effects were produced, except a profuse perspiration, and a general tremor. On ceasing the application of the tractors, to his inexpressible joy, and our satisfaction, the good effects of our labor were now produced and acknowledged; for he voluntarily assured us that he could walk with perfect ease, that he had the entire motion of the joint, and that he was free from pain. To use his own words, 'As to the pain I have now, I do not care if I have it all my life; that will matter nothing; you may take your medicines, I'll have no more of them.' And prior to his leaving the Infirmary, he remarked how very warm those parts were where the tractors had been applied, and then walked from the Infirmary to his own house, assuring his companion that he could very well walk to Beverley.

"June 5th.—Walked to the Infirmary this morning with very trifling difficulty; was so much pleased with the relief or rather cure obtained yesterday, that, to use his own words again, he had very joyfully spread abroad the intelligence to his acquaintance. Has had some return of pain this morning, which, however, was removed by another application, and when asked how he felt, declared 'as bonny as augh,' and then marched off with a counte-

nance expressive of his gratitude for the wonderful relief he had obtained" (op. cit.).

With such evidence as the foregoing of the advantage arising from the employment of wooden tractors, we may safely take the alleged success attending the use of metallic tractors as a fact, and only demur to the mode in which it is explained. The reader will find in the Autobiography of the late Mr. John Vine Hall (1865) many remarkable cases recorded to prove the efficacy of tractorism. Even were his veracity not as unimpeachable as it is, there would be no reason for disputing the facts. For instance, take the two following cases:

"Miss D—, of Hunton, met with an accident six years ago by a fall, which deprived her of the use of both her hands, so that she could not shut either; her knuckles were also much swollen and hard. She had been electrified several times, and had been under medical treatment several years without obtaining relief. She came to my house this morning, and on perceiving the state of her hands I prevailed on her to allow a trial of the tractors. The swelling and stiffness of the knuckles were reduced in ten minutes, and having applied the tractors twenty-six minutes to each hand she could open and shut them with perfect ease, pressing her fingers firmly upon the fleshy part of her hand" (p. 171).

"CONTRACTION OF THE HAND FROM GOUT.—Mr. W. R—, of Maidstone, had long been afflicted with very severe attacks of gout, which frequently disabled him in his hands and feet. About four months ago, his hand became so much contracted that he has not been able to close it to the present time, and the attempt to do so occasioned severe pain in the back of the hand, the skin being tense and hard. At his particular request I applied the tractors, drawing them across the back of his hand, which produced a sensation of great warmth; he then endeavored to close his hand, which occasioned exquisite pain, and he was compelled to desist. I continued drawing the tractors over those parts where the pain was greatest, varying the application from the back of the knuckles to the end of the fingers. The skin on the back of the hand at length became soft, and in twenty minutes from the commencement of the operation he could open and shut his hand firmly without producing the least pain, except

on the knuckle of the first finger. I then applied the tractors a few minutes to this part and the pain entirely subsided" (p. 154).

It is to be regretted that in the following case of lock-jaw so few particulars are given to enable us to judge fairly of its true nature:

"Mrs. P—, a poor woman, in Wharf Lane, Maidstone, was seized with locked-jaw four days ago, and continued in a most deplorable state, attended by a physician and a surgeon till this morning, when she was completely cured in fifty minutes by the application of the tractors. The medical gentlemen had been exerting themselves to the utmost, in the kindest manner, and one of them said he would give a hundred guineas, if he could save her life. This gentleman came into the room whilst I was in the act of using the tractors, which he had never seen before, but kindly said they should certainly have a fair chance, and he directed me where to apply them with the greatest advantage. I continued the operation for forty minutes without any apparent benefit, and then giving the tractors into the hands of the surgeon, returned to my own house awaiting the issue of their further application. In about twelve minutes the surgeon (Mr. S—) came breathless with haste and delight to inform me that he had himself continued the use of the tractors, only ten minutes, when the poor creature opened her mouth. Mr. S— was so fully satisfied of the efficacy of the tractors that he immediately purchased a pair for his own use. Mr. S— writes, 'the case is yours, the suggestion was yours; I merely continued the employment of the measure from the apparent hopelessness of medical means in relieving the distressing complaint. Although previously to the employment of the tractors, I had utterly given up the idea of saving my poor patient; although I feared medicine would prove wholly inefficacious, yet I am not prepared to say that certain death would have been the result; but I do not for a moment mean to impeach the effect of the tractors in this case. I feel conviction that they produced the cure'" (p. 162).

With regard to the experiments made by Dr. Haygarth and others with wooden tractors, it can hardly fail to surprise the reader that these observers were content to stop when they had proved that these instruments were as potent as if metallic. They had relieved their patients by *something*, sooner than they

would otherwise have been relieved; and yet it never seemed to occur to them to continue the practice. They called this something "Imagination," and thought *that* was quite sufficient to dispose of the whole subject. This is, at least, as astonishing as that the public should believe in, and allow themselves to be cured by, the metallic tractors of Perkins and be content to refer the influence to galvanism. If, therefore, any medical reader should be disposed to say that there is no use in recurring to the exploded method of tractorism, I would simply ask whether in his practice he turns *the same principle* to account in any other form? If not, he obviously fails to employ what the Bath Hospital doctors proved to be a very potent remedy.

Section VI.—Effect of exciting certain Mental States (I) under conditions in which an influence may pass as alleged from A to B (Animal Magnetism or Mesmerism); (II.) under conditions in which the operation of this Influence is precluded, or is not alleged by the defenders of Animal Magnetism to affect the results (Braidism).

I. MESMERISM.

If the true explanation of the *modus operandi* of Mesmerism¹ is to be found only in Animal Magnetism, it is clear that it does

¹ The early stage of the mesmeric state, so well described by Agassiz in his own person, would probably be allowed by mesmerists themselves to be capable of induction by psycho-physical means alone. This description is so interesting that I append it: "Neufchatel, Feb. 22, 1839. Desirous to know what to think of Mesmerism, I for long sought an opportunity of making some experiments in regard to it upon myself, so as to avoid the doubts which arise on the nature of the sensations which we have heard described by mesmerized persons. M. Desor and Mr. Townshend (Rev. Chauncy Hare Townshend, A.M.) arrived here with the Evening Courier, and at 10 P.M. Mr. Townshend commenced operating on me. While we sat opposite to one another, he, in the first place, only took hold of my hands and looked at me fixedly. I was firmly resolved to arrive at a knowledge of the truth, whatever it might be; and, therefore, the moment I saw him endeavor to exert an action upon me, I silently addressed the Author of all things, beseeching Him to give me power to resist the influence, and to be conscientious in regard to myself as well as in regard to the fact.

"I then fixed my eyes upon Mr. Townshend, attentive to whatever passed. I was in very suitable circumstances; the hour being early, and one in which I was in the habit of studying, was far from disposing me to sleep. I was sufficiently master of myself to experience no emotion, and to repress all flights of imagination,

not properly fall under our consideration. If cures of disease are performed by a magnetic influence passing from A to B, they

even if I had been less calm; accordingly, it was a long time before I felt any effect from the presence of Mr. Townshend opposite me. However, after at least a quarter of an hour, I felt a sensation of a current through all my limbs, and from that moment my eyelids grew heavier. I then saw Mr. Townshend extend his hands before my eyes, as if he were about to plunge his fingers into them; and then made different circular movements around my eyes, which caused my eyelids to become still heavier. I had the idea that he was endeavoring to make me close my eyes, and yet it was not as if some one had threatened my eyes, and in the waking state, I had closed them to *prevent* him; it was an irresistible heaviness of the lids which compelled me to shut them; and by degrees I found I had no longer the power of keeping them open, but did not the less retain my consciousness of what was going on around me, so that I heard M. Desor speak to Mr. Townshend, understood what they said, and heard what questions they asked me, just as if I had been awake, but I had not the power of answering. I endeavored, in vain, several time to do so, and when I succeeded, I perceived that I was passing out of the state of torpor in which I had been, and which was rather agreeable than painful.

"In this state I heard the watchman cry ten o'clock; then I heard it strike a quarter past, but afterwards I fell into a deeper sleep, although I never entirely lost my consciousness. It appeared to me that Mr. Townshend was endeavoring to put me into a sound sleep; my movements seemed under his control, for I wished several times to change the position of my arms, but had not sufficient power to do it, or even really to will it; while I felt my head carried to the right or left shoulder, and backwards or forwards, without wishing it, and, indeed, in spite of the resistance which I endeavored to oppose; and this happened several times.

"I experienced at the time a feeling of great pleasure in giving way to the attraction which dragged me sometimes to one side, sometimes to the other, then a kind of surprise on feeling my head fall into Mr. Townshend's hand, who appeared to me for the first time to be the centre of attraction. To his inquiry if I were well, and what I felt, I found I could not answer, but I smiled; I felt that my features expanded in spite of my resistance; I was inwardly confused at experiencing pleasure from an influence which was mysterious to me. From this moment I wished to wake and was less at my ease, and yet, on Mr. Townshend asking me whether I wished to be awakened, I made a hesitating movement with my shoulders. Mr. Townshend then repeated some frictions which increased my sleep; yet I was always conscious of what was passing around me. He then asked me if I wished to become lucid, at the same time continuing, as I felt, the frictions from the face to the arms. I then experienced an indescribable sensation of delight, and for an instant saw before me rays of dazzling light, which instantly disappeared. I was then inwardly sorrowful at this state being prolonged; it appeared to me that enough had been done with me; I wished to awake, but could not. Yet when Mr. Townshend and M. Desor spoke I heard them. I also heard the clock, and the watchman cry, but I did not know what hour he cried. Mr. Townshend then presented his watch to me, and asked if I could see the time, and if I could see him, but I could distinguish nothing; I heard the clock strike the quarter, but could not get out of my sleepy state. Mr. Townshend then woke me with some rapid transverse movements from the middle of the face outwards, which instantly caused my eyes to open, and at the same time I got up, saying to him, 'I thank you.' It was

are not (as has already been intimated) illustrations of the influence of A's Mind upon B's Body; the phenomena with which alone we are now concerned. If I assume (as most medical men would) that no such influence exists, and use the cases which Mesmerists have published, as examples of a mere psycho-physical power, I shall be charged by them with not excluding a possible source of error. On the other hand, by rejecting these cases I lose a mass of evidence which otherwise forcibly supports the influence of mental states upon mental disease. If I were to refer, in this chapter, all the phenomena induced by mesmerists, to the monotony of sensory impressions and Expectation I might easily fill it with successful and highly important cures performed through the influence of the Mind upon the Body.¹ And if I do not pursue this course here, I may, at any rate, ask those who do not for a moment doubt that they belong to the same class of facts as those detailed under Braidism, to give them that attention which they surely deserve from this point of view, no less than if they were due to magnetism, and to make use of them under some form of psycho-therapeutics, whether it be through the Imagination, Attention, or Faith. The observations on this subject by Dugald Stewart, an impartial observer of the discussion carried forward in his day with so much acrimony, are so excellent that they will bear repeating here.

"It appears to me," he says, "that the general conclusions established by Mesmer's practice, with respect to the physical effects of the principle of Imagination (more particularly in cases where they coöperated together), are incomparably more curious than if he had actually demonstrated the existence of his boasted

a quarter past eleven (about an hour having elapsed since I passed into the mesmeric state). He then told me, and M. Desor repeated the same thing, that the only fact which had satisfied them that I was in a state of mesmeric sleep, was the facility with which my head followed all the movements of his hand, although he did not touch me, and the pleasure which I appeared to feel at the moment when, after several repetitions of frictions, he thus moved my head at pleasure in all directions." —AGASSIZ (lxxxviii., p. 388). The sensations experienced by several persons when hypnotized, are recorded by me in the *Journal of Mental Science*, in an article on "The Mental Condition in Hypnotism." (April, 1883.)

¹ My own view is that Mesmerism should be practised under the name of hypnotism or Braidism to prevent a confusion of ideas as to its real nature; but full credit should be given to those who performed mesmeric cures long before Mr. Braid's time. Better, however, cure disease under a name which is associated with an unproved theory, than refuse on that account to employ it.

science; nor can I see any good reason why a physician who admits the efficacy of the *moral* agents employed by Mesmer, should in the exercise of his profession scruple to copy whatever processes are necessary for subjecting them to his command, any more than that he should hesitate in employing a new physical agent, such as electricity or galvanism" (xi., iii. p. 221).

Assuming that the first French Commission on Animal Magnetism (1784) were correct in regarding the phenomena as fairly referable to Imagination and Imitation, we must agree with them that they constitute the groundwork of a NEW SCIENCE—that of the Moral over the Physical, or, as they again express themselves, "the power which man has over the Imagination may now be reduced to Art and practised methodically."

Let us take, for instance, the relief of disease afforded by a highly respectable surgeon, and attributed by him to Mesmerism. It is a case of hemiplegia, and is thus reported by the late Mr. Tubbs, of Upwell, Cambridgeshire. Those who knew this gentleman will not call in question his veracity, however much they may differ from his theory.

"Edward Wine, æt. 75, had been paralyzed *two years* in one arm and leg. The left arm was spasmodically fixed to the chest, the fingers drawn towards the palm of the hand and wasted, quite incapable of holding anything; the lower lip was drawn a little down, and could not hold the saliva, which dropped out at the side of his mouth; when walking, would draw the left leg after him. His gait was tottering, and for two years he was never known to walk without a stick. Was locally mesmerized May 21st. In forty minutes he felt me draw a pain from his shoulder to his finger's ends. After the pain was gone he felt as if he could flex and extend the arm, and he accordingly did. By the next operation he managed to hold a spatula in his hand, and exclaimed that he should now be able to eat all the victuals from his old lady. He was able to walk up a staircase into my photographic department, where I took his likeness while he was mesmerized by M. Disnay. He was mesmerized twice a day, and always felt more power in the arm and leg. Last Sunday I stuck a nosegay in his coat and posted him off to church, and he tells me he walked like a gentleman down the aisle, carrying his stick in his lame arm. There being a disposition in his fingers to contract, I have made him wear a splint. I ought not to omit an important

feature in his case; his incontinence of urine is nearly cured" (xxxvi., April, 1855).

My friend Dr. Proctor, of York, attended some years ago a chemist of that city for, he states, "an affection of the bladder and kidneys, accompanied by considerable diuresis, and during sleep there was involuntary discharge of urine that rendered his situation most distressing." Dr. Proctor adds, "All the usual plans of treatment were had recourse to, and the opinion of one of our eminent physicians taken, without any benefit resulting therefrom." The patient was recommended to try Mesmerism, and did so. Dr. Proctor says, "the effect was certainly wonderful; the involuntary discharge of urine ceased at once, and the quantity became considerably diminished; and though certainly his general condition was not materially benefited, the removal of the previously mentioned symptom rendered his life comparatively comfortable, and greatly diminished his sufferings" (xxxvi., 1851). In this case no mesmeric coma was induced, but the usual passes were made, and even on the first occasion produced a state of control over the bladder which had not existed for twelve months. The patient said afterwards that he was opposed to the trial of this process and expected no result; "therefore," he says, "it could not be the effect of Imagination." But although it was not the result of expectant Imagination, it does not follow it was the effect of any other influence than that of his own mind (*e. g.*, Attention) upon his body. Confusion of ideas as to this distinction is exceedingly common. If "passes" assist the direction of the Attention, by all means let them be used. Dr. Elliotson said with great force, in regard to the removal of "ganglions" by mesmeric passes, without friction, "Mr. Braid, Dr. Carpenter, and Dr. Holland must ascribe these cures to dominant ideas, suggestion, and expectant attention, and ought to petition for the introduction of these into the next *Pharmacopœia* of the Royal College of Physicians." We do make this petition; at any rate, let these psychical agents be included in the *Armamenta Medica* of every medical man. I have already shown (p. 381) that Dr. Elliotson admitted that *some* of the effects of Mesmerism might equally well be attributed to the simple action of mental states upon the body, and I am not sure that he would have wholly denied the *possibility* of the relief afforded, in the foregoing cases, being due to the influence of the Attention and other mental

states, assisted by local manipulation. If it be so, it would not be unfair to class these and similar cases of relief, or cure, under the next division—that of Braidism. All, however, we urge here is this, that so far as such cases may be fairly and sufficiently explained by the influencing principles which form the subject of the present volume, they may be employed to prove the great importance of utilizing these principles in practice. Of course, even if shown to be due to a magnetic fluid, it is none the less the duty of medical men to use the mesmeric method, but it forms from this stand-point no part of our own programme. We may, however, employ it if found to be beneficial, and, until convinced to the contrary, attribute its success to the operation of any mental state which we honestly believe, from the effects produced in those cases in which extraneous agencies are excluded, to be sufficient to explain the result.

Deleuze records a case which should be read in connection with one reported by Mr. Braid in the next section, which is very similar. Here it would be reasonable to conclude that the mesmeric cure depended for its success on the same principle as that which obtained in the hypnotic process; and if so, animal magnetism is excluded. Deleuze says, "Opacities in the cornea of the eye have been frequently made to disappear. I am acquainted with a woman whom this disorder, produced by smallpox, had deprived of the use of one eye, and who recovered it while being magnetized for another disease." He adds that Dr. Geritz was consulted about a girl, eight or nine years of age, "who, from the same disease, had one eye entirely covered with a film so thick that she could not see the light. He judged, as did all the physicians who had been consulted, that the disease being incurable by ordinary means, it was useless to administer remedies; but the child having inspired him with much interest, he resolved to undertake her treatment with magnetism. During two months the action appeared absolutely powerless; the third month the film grew thinner, and in the succeeding one the cure was complete" (lxxxvii. p. 146).

II. BRAIDISM.

If the influence of Mind upon Body can be utilized so as to throw the system into a state in which this influence is intensified,

then it is reasonable to hope that psycho-therapeutics will be especially likely to prove beneficial. Now this is what Braidism or Hypnotism, whether it induces sleep or not,¹ effects. The physical strain to which the eyes are subjected may have some influence in exhausting the cerebral force generally or partially through the third pair, and may so allow of the action of the sympathetic upon certain regions of the encephalon, thus suspending the functions of some parts and rendering others more acutely impressible; but the mental strain involved in Attention, has also much to do in producing this result. On this aspect of the subject, the reader is referred to page 40 of this work. Here we shall give a few proofs of the successful results of this mode of treating disease in the hands of Mr. Braid, which, in many instances, combines psychical and physical elements of treatment, the former, however, being the most interesting and important part of the system. "When we consider that in this process we have acquired the power of raising sensibility to the most extraordinary degree, and also depressing it far below the torpor of natural sleep; and that from the latter condition any or all of the senses may be raised to the exalted state of sensibility referred to, almost with the rapidity of thought, by so simple an agency as a puff of air directed against the respective parts; and that we can also raise and depress the force and frequency of the circulation, locally or generally, in a most extraordinary degree, *it must be evident we have thus an important power to act with [in the cure of disease]*. Whether these extraordinary physical effects are produced through the Imagination chiefly,² or by other means, it appears to me quite certain *that the Imagination has never been so much under our control, or capable of being made to act in the same beneficial and uniform manner, by any other mode of management hitherto known*" (vi. p. 5).

To the foregoing should be added Mr. Braid's own definition of Hypnotism, "a peculiar condition of the nervous system, induced by a fixed and abstracted attention of the mental and visual eye, on one object, not of an exciting nature;" and also his process of inducing it, viz., "Take any bright object between the thumb and fore and middle fingers of the left hand; hold it from

¹ Mr. Braid did not induce unconsciousness in more than one in ten cases.

² Mr. Braid gives proof that, independently of the imagination, the phenomena are produced by the fixation of the mind and eyes, and general repose of the patient.

about eight to fifteen inches from the eyes, at such a distance above the forehead as may be necessary to produce the greatest possible strain upon the eyes and eyelids, and enable the patient to maintain a steady fixed stare at the object. The patient must be made to understand that he is to keep the eyes steadily fixed on the object, and the mind riveted on the idea of that one object. . . . After ten or fifteen seconds have elapsed, by gently elevating the arms and legs, it will be found that the patient has a disposition to retain them in the situation in which they have been placed, *if he is intensely affected*. If this is not the case, in a soft tone of voice desire him to retain the limbs in the extended position, and thus the pulse will speedily become greatly accelerated, and the limbs in process of time will become quite rigid and involuntarily fixed. It will also be found that all the organs of special sense, excepting sight, including heat and cold, and muscular motion or resistance, and certain mental faculties, are, *at first*, prodigiously *exalted*, such as happens with regard to the primary effects of opium, wine, and spirits. After a certain point, however, this exaltation of function is followed by a state of depression, far greater than the torpor of *natural* sleep. From this state of the most profound torpor of the organs of special sense, and tonic rigidity of the muscles, they may, at this stage *instantly* be restored to the *opposite* condition of extreme mobility and exalted sensibility, by directing a current of air against the organ or organs we wish to excite to action, or the muscles we wish to render limber, and which had been in the cataleptiform state" (p. 30).

Of the numerous cases published by Mr. Braid it is difficult to know which to select; they all so forcibly illustrate the success of his method. In the following case, condensed from his report, the sight was affected :

In June, 1854, Miss R— consulted Mr. Braid. A year before, she had an attack of ophthalmia, which yielded so far to treatment that she got out of doors in a month. Then a pole fell on the upper and left side of the head, two or three days after which she suffered severe pain, and suddenly became quite blind on that side, with dilated pupil. After four months' medical treatment, sight was partially restored. In January, 1854, while reading, she suddenly lost the sight of the other eye, accompanied with dilated pupil. A few days after, she struck the same part of the head

as before against the mantel-shelf, which was followed by loss of sight of the left eye. She was now led about in a state of total blindness, and was sent to Dublin to be under Mr. Wilde, under whose care she remained six weeks and derived decided improvement, for the iris had become somewhat sensitive to light, and she was able to discern large objects, but could see neither to read nor write. She now returned home, but the improvement in spite of treatment being stationary, her medical attendant recommended her to try hypnotism under Mr. Braid. He found no apparent physical imperfection to account for impaired vision, nor was there any pain about the head or eyes "which had very much the appearance of an incipient case of amaurosis, only the pupils were not quite so much dilated." She could not discern a single letter of the title-page of a book, although some were a quarter of an inch long. "Having hypnotized the patient and directed the nervous force to the eyes, by wafting over them and gently touching them occasionally so as to keep up a sustained act of attention of the patient's mind to her eyes and the function of vision, she was aroused in about ten minutes. I now presented before her the title-page of the same book, when she instantly exclaimed, with delight and surprise, 'I see the word commerce!' pointing to it. I now told her she would see more than that presently; and in a little while she exclaimed, 'I see commercial,' then, 'I see dictionary;' and shortly after, 'I see McCulloch,' but she could see nothing more. I told her that after a little rest, I felt assured, she would see still smaller print; and after a few minutes, she was able to read 'London, Longman, Green and Longmans.' Such was the result of my first process. After a second hypnotic operation, next day, the patient could read, when first aroused, the whole of a title-page of a pamphlet; and in about five minutes after, she read two lines of the text. After another operation, the same day, she could read the small, close print in the appendix; and was able the same evening to write a letter home reporting progress, for the first time for twelve months. She only required two more hypnotic operations, when she was found able to read the smallest sized print in a newspaper; after which she left me, quite cured, and, as I have heard, she has continued well ever since" (lxxxiv. p. 36). No medicine was given.

In another case, Mrs. Stowe, aged forty-four, who from weak

sight, had used spectacles for twenty-two years, and could not, without them, distinguish the capital letters of advertisements in a newspaper, nor the large heading of the paper, was able to read both the large and small heading, the day, month, and date of the paper, after being hypnotized by Mr. Braid for eight minutes, and in returning home, could read the sign-boards which she had not done for years before. Her sight continued to improve—she could thread her needle, No. 8, without spectacles—and Mr. Braid states “this patient has retained the improvement of her sight” (vi. p. 170).

One case reported by Mr. Braid is particularly interesting, because it proves the effect which may be produced when the affection is not in any degree “on the nerves,” for actual opacity of the cornea was removed (compare page 138). Mrs. S— had severe rheumatic fever in 1839, during the course of which the left eye became implicated, involving both its internal and external structures. When seen by Mr. Braid in 1842, the eye was free from pain, but was of no service. There was opacity over more than one-half of the cornea, sufficient to prevent distinct perception of any object placed opposite the temporal half of the eye, all being seen through a dense haze, and objects placed towards the opposite side were seen very imperfectly, owing to the injury the choroid and retina had sustained in the points on which the images of such objects were reflected. The opacity was not only an obstacle to distinct vision, but was also a source of annoyance from its disfigurement, being obvious even to those at a considerable distance. She was a relation of Mr. Braid, and was in his house three months before he operated upon her, during which time no change took place. Violent pain in the arm and shoulder induced her to submit to the hypnotic treatment, which proved successful; but what was more surprising and quite unlooked for by Mr. Braid, her *sight* was so much improved that she was able to see everything in the room, and to name different flowers, and distinguish their colors, whilst the right eye was shut, which she had not been able to do for more than three years and a half previously. The operation was continued daily, and in a very short time *the cornea became so transparent, that it required close inspection to observe any remains of the opacity.* After the first operation there was considerable smarting in the eye, which continued all night, and in a less degree, after

future operations, which, no doubt, roused the absorbents and effected the removal of the opacity. Stimulating the optic nerve to greater activity, however, must have been the chief cause of the very rapid improvement, which enabled her to see objects after the second operation. Mr. Braid adds to the foregoing, that objects were seen from the temporal side of the eye much more distinctly than from the nasal side, owing to the irreparable damage the retina and choroid had sustained (vi. p. 175).

Mr. Braid was successful in exciting the sense of hearing in even the deaf and dumb. The following is one of the cases recorded :

Nordan, deaf-mute, æt. 24, "was never considered to have the power of hearing, properly so-called, according to the opinion of the head-master of the Deaf and Dumb Institution (Mr. Vaughan), where he was a pupil; after the first operation (including hypnotism, then extending the limbs, and fanning the ears), I satisfied myself he had no sense of hearing; but after the second, which I carried still further, he could hear, and was so annoyed by the noise of the carts and carriages when going home, after that operation, that he could not be induced to call on me again for some time. He has been operated on only a few times, and has been so much improved, that, although he lives in a back street, he can now hear a band of music coming along the front street, and will go out to meet it. I lately tested him, and found he could hear in his room, on the second floor, a gentle knock on the bottom stair. His improvement, therefore, has been both decided and permanent, and is entirely attributable to hypnotism, as no other means were adopted in his case" (vi. p. 182).

Mr. Braid's method was not only effective in cases of hysterical paralysis, but was certainly beneficial in those in which serious organic disease was present. Thus, "a gentleman, æt 60, had a paralytic stroke two years and a half before consulting me, which deprived him entirely of the use of the right arm, and enfeebled the right side and leg. When he called on me, he walked very feebly, could scarcely close the fingers and thumb, and could not extend them fully. He could, with great difficulty, raise the hand as high as the pit of the stomach; the pupil of the right eye was considerably larger than the left, and not quite circular; speech very imperfect. After being hypnotized for five minutes, he was able to open and close the hand freely, and to raise the hand

above the head, and pass it to the back of the head, and he could also walk and speak much better. Pulse regular; before the operation, it was very irregular." Seven weeks after, Mr. Braid reports that the improvement was permanent. "He could speak and walk much better, could raise the arm and move the fingers and hand freely, could pass the hand above and over the head, and take off his hat with it. The right pupil was also quite circular now, and nearly the same size as the other" (vi. p. 215).

Another case, T. J—, æt. 36, had a paralytic seizure, which deprived him of feeling and motion of the left arm and hand. Nearly three months after, Mr. Braid saw him. He had partially recovered the use of his fingers, and could raise his arm nearly to the horizontal position; but just before he was seen by Mr. Braid, he had had an accession of the paralytic symptoms, and the arm was spasmodically fixed to the side. After being four minutes hypnotized, he could move the fingers, hand, and arm freely, elevating it above his head, and retaining it in any situation he was asked. The feeling, however, remained very imperfect. He was subsequently hypnotized, and in four days the feeling as well as power was restored. He remained well (p. 217).

The following instance of relief from rheumatism is important, because there was no Faith, Expectation, or Imagination present to cause it. The mental element was therefore confined to the Attention.

"Mrs. P—, upwards of fifty, had suffered so severely from rheumatism that she had not enjoyed a sound night's rest for seven months. External and internal means, which had been beneficial in a former similar attack, had been tried without effect before I was sent for to visit her. She was suffering excruciating pain in one leg, particularly above the knee-joint. When I proposed to relieve her by hypnotism she repudiated the idea, told me she had no faith in it, and felt assured in her own mind that such an operation could be of no use to her. I told her I cared little for her want of faith in the remedy, provided she would submit to be operated on as I should direct. She at last consented, and in the presence of her three daughters was hypnotized. In eight minutes she was aroused, and was quite free from pain; wished to know what I had done to her; said she felt sure hypnotizing her could not have relieved her. To this I replied by asking where her pain was felt now. She answered she felt no pain, but

persisted she was sure I had done nothing to take it away. The manner in which she could walk and move her limbs was sufficient proof the pain was gone, notwithstanding her scepticism about the agency. When I called next day, I was informed by her family that *she had slept comfortably all night*, and had gone out, being quite well. Two days after I called again, and was informed by her that she had been overtaken in a shower, and had overexerted herself on that occasion, and had had a return of the pain, although not so bad as at first. I hypnotized her again with complete relief, and she has never required a repetition of the operation since; so that she has now enjoyed a release from her old enemy for eleven months, in defiance of her scepticism" (vi. p. 235). This fact is most important.

We will only cite another case of rheumatism, that of a boy, æt. 12, who was suffering from a violent rheumatic affection of the legs, back, and chest, so that he required to be carried into Mr. Braid's house. After being hypnotized, he was so much relieved as to be able to walk about the room freely, and to walk to his cab without assistance. Next day he called and was hypnotized again, and left quite free from pain, and remained so well as not to require another operation. This boy took no medicine, and had no external application (loc. cit.).

The influence of Braidism when carried to the stage of "nervous sleep," must be regarded as among the secondary effects of psycho-physical agents. Sound and refreshing sleep in cases of insomnia is no insignificant blessing; and we have no doubt there may be instances in which to produce it by acting upon the mind is more beneficial in the long run than by employing even chloral or bromide of potassium. So in regard to psychical anæsthesia, in view of the danger to life which attends the employment of chloroform, etc., there may be cases in which it is safer, although it may be more tedious. See p. 57 of this work.

Quite recently, at a meeting of the Medico-psychological Association, one of the speakers, Dr. Huggard, mentioned having made a practical application of hypnotism which is of much interest.

A lady¹ at Sussex House Asylum, Hammersmith, æt. about forty-five, and laboring under melancholia accompanied by cata-

¹ The case is taken from the report of the meeting in the *Journal of Mental Science*, July, 1883.

leptic symptoms, "refused her food from the belief that it was poisoned, and on several occasions it was necessary to use the stomach-pump. At this time the speaker, impressed with Dr. Hack Tuke's paper on *Hypnotism*, and Tamburini's and Sepelli's experiments on the same subject, had recourse to this agent. The dangling of a bunch of keys for a few minutes before the patient's eyes brought on the hypnotic sleep. While in this state, any idea suggested was believed, and commands were obeyed. She was ordered to eat, and she ate. She was ordered to drink, and she drank. She was ordered to go through various quick movements, and she did so. She was told that she was the happiest mortal in the world and was desired to laugh; her face lighted up, an unaccustomed smile came upon her lips, the croaking noise of unwonted and almost forgotten laughter was heard, which soon, however, with practice, softened into more natural sounds. Hypnotism was employed off and on for a week, and was then discontinued, lest a habit should be formed; but during the employment of this means, marked improvement was observed, which had continued, and now the lady was convalescent. In this case a new device was adopted to compel the ingestion of food. But more than this, an opportunity was afforded of reaching and exciting to action long disused nervous channels."

The foregoing cases constitute, in my opinion, a most practical answer to the questions with which we commenced the chapter; more practical, probably, than those which have been given under the other modes of treatment, which involve the action of Mind upon Body in the cure of disease. Braidism possesses this great advantage—that while the Imagination, Faith, or Expectation of the patient may be beneficially appealed to, this is not essential; the mere concentration of the Attention having a remarkable influence, when skilfully directed, in exciting the action of some parts, and lowering that of others. The short period of time required, also, compares favorably with that consumed in some other forms of mental therapeutics. It is to be hoped that fresh interest will be awakened in this method of relieving pain, defective action of the nerves of special sense, and neuro-muscular affections, whether arising from excessive or defective action, and that a more general use will be made of it by those who are engaged in the active practice of their profession.

Lord Bacon, with his wonderful range of vision, both physical and metaphysical, did not omit to hint at "the inquiry how to raise and fortify the Imagination; for," he adds, "if the Imagination fortified have power, *then it is material to know how to fortify and exalt it*" (xiv., i. p. 127). He enters a protest against charms, characters, and ceremonies, but observes that, in regard to "the operation of the conceits and passions of the Mind upon the Body, we see all wise physicians, in the prescriptions of their regimens to their patients, do ever consider *accidentia animi* as of great force to *further or hinder* remedies, or recoveries." He says, "It is an inquiry of great depth and worth concerning Imagination, how, and how far it altereth the body proper of the Imaginant." It does not follow, indeed, that, because "it hath a manifest power to hurt, it has the same degree of power to help. But the inquisition of this part is of great use, though it needeth, as Socrates said, 'a Delian diver,' being difficult and profound."

If for the word Imagination we substitute Mental States, may we not say that Mr. Braid has proved himself the Delian diver whom Bacon hoped to see?

SUMMARY.—1. The influence of the Mind upon the Body, shown in Parts I., II., III., to operate powerfully in health, is at least as powerful in disease, and may be highly beneficial in aiding the *vis medicatrix*, and opposing the *vis vitatrix Naturæ*. Its action may be gradual; or sudden, as in the shock of a railway accident (see *Preface*).

2. This truth is by no means confined, as it is often supposed to be, to nervous disorders, but extends to other diseases.

3. The principle may be carried out, in a general way, by calming the mind when the body suffers from its excitement; by arousing the feelings of Joy, Hope, and Faith; by suggesting motives for exertion; by inducing regular mental work, especially composition; by giving the most favorable prognosis consistent with truth; by diverting the patient's thoughts from his malady; and thus, in these and other ways, influencing beneficially the functions of Organic Life through the Mind.

4. The influence of the Will upon disease, apart from voluntary Attention, is a very important agent in Psycho-therapeutics.

5. The effects accidentally produced upon the body by mental impressions, in disease, can be imitated, and the arts employed

by the empiric (see *Preface*) can be divested of their non-essentials, and systematically utilized.

6. There are various methods by which this may be effected, and it is not necessary to adopt any one to the exclusion of the rest; but Braidism offers great advantages.

7. The great principle which appears to be involved in all, is the remarkable influence which the mind exerts upon any organ or tissue to which the attention is directed to the exclusion of other ideas, the mind gradually passing into a state in which, at the desire of the operator, portions of the nervous system can be exalted in a remarkable degree, and others proportionately depressed; and thus the vascularity, innervation, and function of an organ or tissue can be regulated and modified according to the locality and nature of the disorder.

8. The psychical element in the various methods comprised under psycho-therapeutics is greatly assisted by physical means, as gentle friction, pointing, passes, etc.;¹ and this in two ways: first, by more definitely directing the Attention to a part in which it is desired to set up healthy action; and, secondly, by locally exciting the vascular and nervous activity, or directing it into another channel. In Braidism the physical element is still further employed in straining the eyes, and so exhausting some portion of the brain.

9. Unconsciousness may or may not be induced; the relief and cure of disease following the processes adopted when the patient remains conscious of what is going on. When there is sleep, its character resembles that of somnambulism, and not ordinary sleep.

10. Potent as is the influence of mere Attention directed to a particular region of the body, it may be neutralized by a contrary Expectation, and intensified by Faith and a vivid Imagination.

¹ In his *Nature and Art in the Cure of Disease*, Sir John Forbes (under the head of regimenal means desirable to adopt) includes "the sight of monotonous mesmeric passes, or fixed attention on an object, to produce mesmeric sleep or hypnotism; and" (under the head of physical means) "mesmeric and hypnotic manipulations."

CHAPTER XVIII.

CONCLUSION.

WE have now completed our survey of Psycho-physical Phenomena; those resulting from the action of the Mind upon the functions of the Body, short of disease, and which may be classed under Psycho-physiology; those constituting morbid states and which should be included under Psycho-pathology; and, lastly, those phenomena involving restorative processes, which justify the employment (in addition to physical remedies) of a reasonable Psychopathy, or Psycho-therapeutics—a preferable term in an age when the multiplication of *pathies* is undesirable.

Let us briefly glance at the broad principles and the most salient facts which have come under our notice in this investigation into Psycho-physical Phenomena.

We have seen that the influence of the Mind upon the Body is no transient power; that *in health* it may exalt the sensory functions, or suspend them altogether; excite the nervous system so as to cause the various forms of convulsive action of the voluntary muscles, or depress it so as to render them powerless; may stimulate or paralyze the muscles of organic life, and the processes of Nutrition and Secretion—causing even death; that *in disease* it may restore the functions which it takes away in health, re-innervating the sensory and motor nerves, exciting healthy vascularity and nervous power, and assisting the *vis medicatrix Naturæ* to throw off diseased action or absorb morbid deposits.

Sir John Forbes assuredly did good service to medicine by showing the extensive influence of this force in the cure of disease. He thought, as is well known, that the curative powers of nature suffice to explain all the triumphs of homœopathy. But he also thought that the influence of the Imagination should be reckoned among “some of the additional influences essentially connected with the exercise of a new system.” His great object, indeed, was to prove that “nature can cure diseases without

assistance from art," and he adduces in proof "the cure of diseases among uncivilized nations of ancient and modern times, under the sole influence of magic charms or other practices equally ineffective."

With regard to Faith it is true that it can never be placed on a par with the action of a drug like jalap, the effect of which is certain and independent of faith or belief. It will act equally upon the intelligent and upon the ignorant, whereas we cannot resort to faith in a case in which the patient possesses such knowledge as prevents his power to believe that he will be cured by *nil*. He may know very well that faith alone will cure as an abstract truth, but for himself he cannot have faith in faith alone. Hence the limitation of the principle of cure by faith. As a fact, indeed, medical men are the least easily relieved by medicines, because they want faith and are too thoughtful. It is but too true in regard to those who are laboring under disease *Minus credunt, quæ ad salutem suam pertinent, si intelligunt (Pliny)*. If it is a blessing to savage nations that the medical art should be introduced, it must not be forgotten, and it is a satisfaction to reflect that the means resorted to previously by the natives, even when consisting solely of charms and incantations, had been attended by the relief of pain and the cure of disease. The savage is without the never-ceasing interest which attaches to the pursuit and acquisition of knowledge, but he who knows most, pays the penalty of his superiority in this respect by the loss of that healing charm which springs from unhesitating medical faith. True, faith alone will not cure a certain number of diseases, but alas! neither will our *Materia Medica*, and the line which separates the possible and the impossible in the one case, too often proves identical with that which separates them in the other.

From this point of view, scepticism in the physician is the best means of arriving at the truth, faith in the patient the best means of arriving at health. Doubt is the key by which to open the treasure-box of medical knowledge; Belief is the lock which the patient must not break if he wish to procure the blessings of health.

We have seen the importance of the reflex action of the Mind or the Brain upon the Body on the one hand, and of the Will on the other, the former occasioning a host of disorders of sensation and motion, and the latter exerting great power over the system

directly and indirectly; directly, in controlling reflex action of the nervous centres whether encephalic or spinal; indirectly, by acting on the mind itself, in disposing it to pass into such states as shall excite certain bodily functions, by virtue of those well-recognized psycho-physical laws which then come into operation.

We have also seen the far-reaching influence of that antagonism which appears to exist between the two great divisions of the nervous system in regard to vascularity. Upon this principle we have had again and again to fall back, in endeavoring to trace the mode in which so many striking physical phenomena succeed to varying mental states. The normal equilibrium which we witness between the cerebro-spinal and the sympathetic systems, as respects their influence upon the bloodvessels, is obviously more or less interfered with when the mind or brain is unable to exercise its accustomed force, or when it transmits a more than wonted impulse; allowing the unrestrained action, or paralyzing the influence of the sympathetic vaso-motor nerves. The general impression that the emotions act specially upon the sympathetic system is, on this hypothesis, only true in the sense that this system is liberated to act with excessive force, or prevented acting as in health, by the change wrought, in the first instance, in the organ of the mind. At the same time it is difficult to see any reason why there should not be a direct action upon the sympathetic centre or centres—as direct as occurs in galvanism.

The application of a similar principle in regard to the functions of the cerebrum and the spinal cord explains the unbalanced action of the latter when the former is temporarily paralyzed by mental shock, and probably goes far to explain, without any further principle, the remarkable influence of the emotions in causing convulsive disorders.

That Imagination and Faith can exert some influence over disease, no one, I suppose, disputes. The great question is, What is the extent of this influence—what are its limitations? The inquiry has two important bearings; one on the practical employment of this power in medicine, and the other on the truth of alleged miraculous cures.

I think the cases recorded in these pages prove beyond a doubt that while nervous affections present the grand field for psychical therapeutics, diseases beyond the neurotic boundary may be amenable to the same healing influence, as, for example, gout.

On the other hand, I readily grant that for serious organic affections the range of mental influence is decidedly limited. At the same time, seeing that it is indisputable the frame or attitude of mind acts powerfully upon the skin, kidneys, and bowels, and seeing that the rôle of the physician is to act upon these, there is no good reason for excluding the beneficial influence of mental agents in some non-nervous affections. That these may act injuriously, even unto death in organic diseases, daily experience proves; why then may they not act in the direction of health and life? Lastly, who shall venture to draw the line between organic and functional; and who will pretend to assert that any tissue of the body is beyond the range of nervous influence?

The alleged miracles of our day, brought prominently to the front in articles in the *Nineteenth Century*, have attested the fresh interest attaching to the question of their true character. Too generally have the combatants debated the question as if there were but two rival camps in the field, as if, in short, there were no alternative between knavery and miracle; whereas, if the principles insisted upon in this volume be true, the vast mass of these alleged supernatural cures admit of another interpretation—one less repulsive to the charity which hopeth all things, whether in those who eagerly apply to their sores the cement of the chapel at Knock, or who flock, full of faith, to the grotto of our Lady at Lourdes. If, however, cures are performed which transcend the power of the wildest imagination and the most ardent faith to effect; if fractures are instantly set, if cancers are presently dispelled, then the explanations offered in this work are insufficient, and others must be sought outside the realm of psycho-physical phenomena, one into which the author does not presume to enter.

The extraordinary effects produced by the Imagination and by the force of the Will, recorded in the preceding pages, would, in truth, leave upon the reader's mind a too unqualified impression, if he did not at the same time bear in mind that there are limits to their influence. The case of Edward Irving shows the marvellous influence of faith and determination; but the final incident of his life illustrates equally well the remark we have just made.

He had been strongly recommended by his physician to seek health in a milder climate, but it would seem that he regarded

himself commissioned to do a great work in Scotland. His letters home clearly enough indicate the certain advance of fatal disease, accompanied by his repeated expressions of belief that he would not die. "He had not yet come," says his biographer, "to the discussion of the last question, which, like all the rest, was to be given against him, but still smiled with a heart-breaking confidence over the daily dying of his own wasted frame, waiting for the wonderful moment when God should send back the vigorous life-current to his forlorn and faithful heart." Dr. Rainey attended him in his dying hours, and described to Mrs. Oliphant "the noble, wasted figure, stretched in utter weakness, but utter faith," expecting that life and strength would still arise out of visible dying. Irving assured him "how well he knew that he was to all human appearance dying, yet how certainly he was convinced that God yet meant to raise him." But Faith and Will have their limits, and poor Irving died in spite of their exercise to an extent unsurpassed, so far as I am aware, in any other instance. Not long before his death "they heard him murmuring to himself in inarticulate argument, confusedly struggling in his weakness to account for this visible death which, at last, his human faculties could no longer refuse to believe in" (Mrs. Oliphant's *Life of Edward Irving*, p. 404).

A striking instance of the failure of an attempt to cure disease through the medium of the Imagination occurred some years ago in Germany. A Curé in the Canton of Reichshoffen announced to his parishoners that, in concert with Prince Hohenlohe, he would on a certain day cure those who were ill of their disorders. For this purpose he appointed a day on which he would say mass, and he promised that those who were present at its celebration should be healed. In the mean time, an interval of nine days, he engaged in devotion on behalf of the sick in his commune. The day came. From ten o'clock the sound of the bells gave notice that the ceremony was being performed. Crowds of patients flocked to the church. The preacher was eloquent, the whole service imposing—there seems no reason to suppose that Faith and Hope were not duly worked upon, but it was a terrible failure. The poor creatures returned home worse than when they came, harassed and disappointed, "desesperant d'obtenir jamais," adds the *Courrier du Bas-Rhin*, from which this

account is taken "une guérison que le ciel venait de refuser, malgré les promesses si positives du Curé" (lx. p. 54).

It may be supposed that the Curé did not possess that undefinable and inimitable something—tact, pluck, or infectious confidence—which was the gift of Prince Hohenlohe, and which the ceremony performed with all due form proved insufficient to raise the diseased to the cure-pitch of enthusiasm and faith. Something may have been due to the incurable nature of the cases which the imitator of Hohenlohe attempted to cure; but this would not explain the total failure of the experiment, inasmuch as many popular lay curers of disease, and I believe Hohenlohe himself, have been unable to *choose* their cases, and have had to depend for success on the large proportion of favorable results.

We might refer also here to the cases of ecstatic mysticism, in which dwelling intently and rapturously upon the passion of the Saviour either failed altogether to produce the stigmata so readily induced in others of more susceptible temperament, or produced them after a longer time. As pointed out by M. Maury (op. cit., p. 219), Ursula Aguir, and Hieronyma Carnaglio, although in their ecstatic visions they believed they had received the wounds which were inflicted upon Christ, and although experiencing all the torture thereof, did not exhibit the slightest trace upon their persons of these wounds. So with Catherine of Vienna, Magdeleine de Pazzi, Coleta, and others mentioned by the same author. St. Gertrude (14th century) imagined in one of her visions that she had received a rose-colored mark on the skin from contact with Christ, but not the slightest trace of the mark was found. Again several saints, however intently dwelling upon "the crown of thorns," and fully experiencing, in vision, all the sufferings of the Saviour, found no impressions, or only very slight ones, when others more favored presented decided results upon the skin.

In connection with the limits of the power of the imagination to cure disease, ought to be considered the liability to relapse. There can be no doubt that in a very considerable number of cases relieved by this means, relapse occurs sooner or later. Madame de St. Amour's success in controlling disease through the operation of purely mental agents has been several times referred to in this volume. An apparently reliable witness of many of her apparent cures observes, "Nearly all the cures have

been temporary. . . . I have seen a young lady walk straight at the command of Madame de St. Amour. I was told her ordinary walk was a limp, but not having myself seen this, I doubted the fact. The improvement did not last; a week after she began to limp as much as ever." He adds, "it is precisely the relapse which has removed my suspicions, and has rendered still more inexplicable to me the mode of action of Madame de St. Amour's cures" (lx. p. 59).

The psycho-physical forces have, then, their limits, both in regard to extent and in regard to the duration of influence, and there remains a third indication of limitation. The Imagination fails altogether to produce certain phenomena in certain persons. The witness of the success of Madame de St. Amour, after his narrative, thus proceeds: "I now come to my own experience. Having experienced for a considerable time some pains in the epigastrium, I begged Madame de St. Amour to relieve me. She endeavored to do so, but in vain. On another occasion I saw her extend her hands towards those who surrounded her, and ask them whether they experienced a sense of coolness. Each person answered 'yes!' but the fact is that, as regards myself, I felt nothing at all" (l. c.).

Not only is the Will limited in its power to resist disease, but in some cases the more the will is exercised, the more troublesome the disorder becomes. This applies to nervous affections in which the struggle between the will and the fear of failure produces increased irregular action. Thus in the example of contraction of the mastoid narrated by Hunter, the expectation of seeing a stranger before whom the lady was particularly anxious not to exhibit the defect, paralyzed her will and induced overpoweringly violent spasm.

It may be objected to a large number of the illustrations recorded in this volume that they are not recent cases, and I have heard the question asked why, if they happened some years ago, do they not happen now? My reply is that they do happen now—that they are always happening. Make what allowance you will for the possible deception and the certain errors in diagnosis of disease in the miraculous cures at Lourdes; make a like deduction from the recoveries occurring at the "Bethshan" house in the north of London, under the Rev. W. E. Broadman; tak off a considerable percentage from the cures performed by home

opathists as due, no doubt, to the *vis medicatrix Naturæ*, unaided by mental influences, and you will still have, I maintain, ample evidence of the therapeutic influences of Expectation, Faith, and the concentration of the Attention on the seat of the disease. That this question should be asked, and that grave doubts should be expressed as to the reliability of the cases on record of the remarkable influence of the mind in the cure of disease, is a striking proof of the necessity, which I confess I have sometimes doubted, of recording case after case, with a view of placing beyond the possibility of cavil by reasonable men, the fact that mental excitement directed in a certain channel will exercise the influence claimed for it in this volume.

If I am mistaken, and have grossly exaggerated this power; if the cases recorded are not really examples of mental influence; if rheumatism was not cured by wooden tractors at the Bath Hospital; if scurvy has not been relieved by inert potions; if gout has not been cured by fright; if warts do not disappear under confident expectation or faith, then, indeed, we are thrown back upon preternatural explanations, and the actual efficacy of charms and of infinitesimal doses must be credited. For just in proportion as the range of the influence of the mind upon the body in health and disease is circumscribed and narrowed, will the area of the charlatan be extended and fortified.

It would be certainly quite possible to substitute for all the old cases recorded in this volume, more recent examples; but to the next generation these would, on the ground of age, be equally open to criticism. Besides, we do not attach so much importance to our own testimony as to suppose that the reader would credit a case witnessed and reported by ourselves, more than one given on the authority of Rush, Hunter, Abercrombie, Sir John Forbes, or the surgeons of the Bath Hospital.

That the principles upon which so much stress is laid in this work admit of practical application, not only to the treatment of diseases, but to questions arising in the law courts, was shown in the case of *Gaunt v. Fynney*, in the Court of Chancery, Nov. 14, 1873. The plaintiffs were two unmarried ladies, living at Leek, in Staffordshire, who applied for an injunction to restrain an alleged nuisance by noise and vibration occasioned by the working of an engine and machinery in the silk mills of the defendant. There were other matters of complaint to which it is unnecessary

to refer. (Upon the hearing of the case before the Master of the Rolls in the preceding February, he was of the opinion that the plaintiffs were not entitled to an injunction.) In the Court of Chancery, Mr. Fry, Q.C., urged for the defendant, among other reasons, that the influence of the imagination would, as stated in this work, materially affect the impressions received by persons constantly dwelling upon a nuisance of this nature, and quoted from these pages in support of his contention. The Lord Chancellor (Selborne) in delivering judgment observed, as reported in the *Times*, "Those who compare the noise which they hear to-day with the noise which they heard months or years ago, are witnesses (within certain limits) to impressions upon the mind rather than to facts. Those who speak of the manner in which the engine and machinery have been worked and the business of the mill carried on, speak of facts, and not of impressions upon the mind. Mr. Fry made a happy use, in part of his argument, of a passage in a recent work upon mental science which, treating of the influence of the mind upon the sense of hearing, says that, 'the thought uppermost in the mind, the predominating expectation, makes a real sensation from without assume a different character.' Every one must have had some experience of the truth of this statement; a nervous, or anxious, or prepossessed listener hears sounds which would otherwise have passed unnoticed, and magnifies and exaggerates with some new significance, originating within himself, sounds which at other times would have been passively heard and not regarded. In the present case I have no doubt that a real 'whirring sound,' such as the plaintiffs' witnesses describe, did proceed from the machinery in the mill when at work at all times, before as well as after the erection of the steam-engine in 1864-5. But this is admitted to have gone on from January, 1865, to June, 1870, without amounting to a nuisance. His Lordship then proceeded to comment upon the evidence, observing that there were some facts clearly established by trustworthy evidence which appeared to him to be inconsistent with plaintiffs' case, and that it was proved to his entire satisfaction that on the 17th of July, 1871, when the engine was worked at its full speed and in its usual manner, no noise or vibration amounting to a nuisance was heard or felt in any part of the plaintiffs' premises." The plaintiffs' appeal petition was dismissed with costs.

In the course of this inquiry, I have, I trust, succeeded in one of the objects I had in view, that of elucidating the nature and action of what is usually understood as the Imagination.

I hope, in conclusion, that some positions open to attack have been made more secure by the evidence collected together in this work.

I think, for example, that the reader who has had the patience to accompany the author *ab ovo usque ad mala* will agree with him, that they are needlessly sceptical who, with a well-known physician, "doubt the instances of sudden change in the color of the hair consequent on a powerful mental emotion, the evidence by which such instances are supported being questionable," and that those greatly err who believe, with an able writer on this subject, that "the Imagination is all-powerful, *except over disease*—the dominion of disease being exerted over Imagination itself."

Imperfect as the handling of this wide and important subject has been in its varied aspects, the Author trusts that he has succeeded in placing upon a firm and rational basis the complex phenomena resulting from the Influence of the Mind upon the Body.

APPENDIX.

IN the former edition of this work we gave a detailed analysis of the cases referred to, with a view of determining the relative influence of the various mental states. We do not think it necessary, however, to do more than indicate in general terms the results to which this analysis pointed:

1. Out of the total number of illustrations, about thirty-five per cent. were derived from intellectual states (Imagination, Expectation, Attention, Imitation and Sympathy, Memory, and Excess of Study); fifty-six per cent. were of emotional origin, while barely eight per cent. illustrated the influence of Volition.

2. Of Intellectual States, Imagination and Expectation exerted most influence; of Emotional States, Fear and Fright were the most potent.

The above is, of course, an exceedingly rough estimate of the proportionate influence of these states. Still, it is relatively correct; and in the sense in which the expression "influence of the Mind upon the Body" is employed in this work, we reach by statistics very much the result we should expect, namely, that the direct action of the Will, however important, is the least frequently exerted power in relation to the psycho-physical phenomena which we have been desirous to investigate; that the Intellect, comprising among other faculties that of Attention, directed in the first instance by the Will, exerts a greater influence; while the Emotions far exceed both put together in their action, whether in health or disease, upon the bodily organs and tissues.

One striking fact is elicited by this investigation, that while the emotions are by far the most operative in what we may call chance cures of disease, they have, with the exception of Hope

and Faith, which can only be distinguished from simple Expectation by their intensity, comparatively slight influence in regularly designed Psycho-therapeutics, in which the Imagination, Expectation, and Attention play the most important part. I am disposed to think, however, that in Braidism the remarkable change which can be induced in the circulation by combined physical and psychical processes, answers in great measure to that which occurs from powerful emotional excitement. Hence rheumatism may be relieved in both instances, as, for example, in the railway accident referred to in the Preface, or in the operation performed by Mr. Braid in such a case as that mentioned under "Psycho-therapeutics." The condition of the circulation is entirely altered, and local congestions are removed.

3. SEX, AGE, DISEASE.—As regards *sex*, out of the cases in which the sex is stated, sixty-four per cent. were males, and thirty-six per cent. females. The large proportion of the former shows (what is very important) that men are highly susceptible to mental impressions, and that, therefore, Psycho-therapeutics are available for them as well as for women. It is not, as is so often intimated, only hysterical young ladies who come under the influence of this agency. At the same time it would not be fair to conclude from this analysis that men are more or even equally liable to be affected by psychical forces, because the very frequency of examples of such influence among females prevents medical men reporting them, while they do report cases which occur in men on account of their being rarer, and therefore more interesting. We therefore simply maintain that there is ample proof that the bodies of men as well as women may be largely acted upon by the influence in question. In reference to *age*, it has been impossible to obtain it in the majority of cases, but it may be stated generally that, with the exception of about twelve per cent., the individuals were adults, their age probably being, in most instances, between twenty and thirty-five. Lastly, the most frequent forms of *disease* induced in persons in health, were those comprised under convulsive affections, epilepsy, chorea, paralysis agitans, and hydrophobia; while the diseases most frequently benefited were undoubtedly rheumatism, gout, and dropsy, the last mentioned being relieved by the increased action of the kidneys from mental influence. No doubt, however, if all the cases of hysterical neuralgia and contraction of joints were

reported, those which are called merely nervous affections of the body would take priority. The only inference which we are justified in drawing from these figures is, that the beneficial influence of Psycho-therapeutics is by no means confined to nervous disorders. It is also satisfactory to know that, as respects occupation or position in life, very opposite classes are represented—the rich and the poor, the learned and the ignorant. Even incredulity, when the attention can be arrested, is not necessarily a bar to success. Failure, on the other hand, it must be remembered, may attend all systems of treatment; and what Bacon says in reference to one form of Psycho-therapeutics may be applied to all—“Men are to be admonished that they do not withdraw credit from the operations of the Imagination because the effects fail sometimes.”



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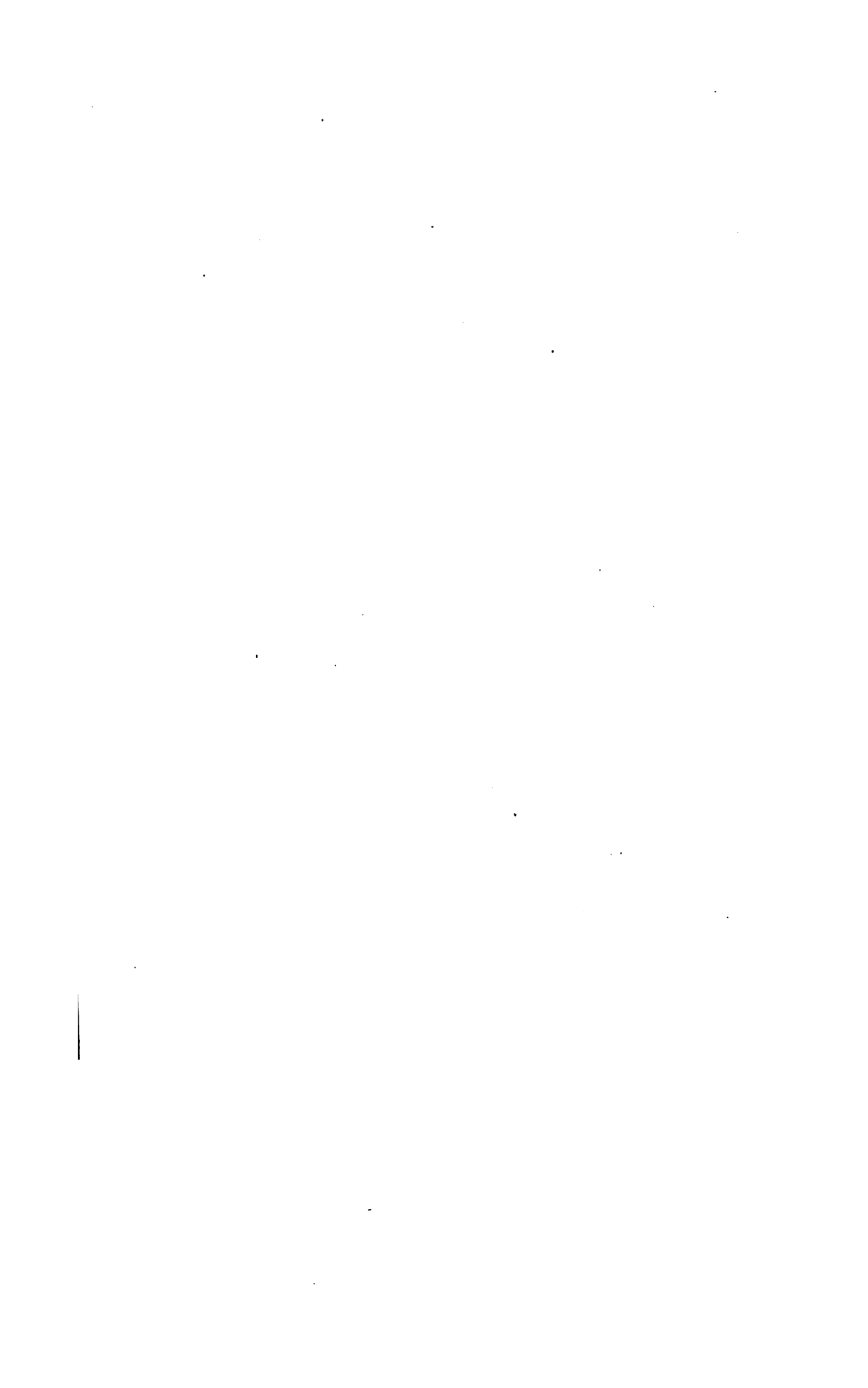
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